The influence of sexual coercion at first sex on subsequent risk behaviours among adolescents in Cape Town, South Africa

by

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Declaration

I, JERUSHA NISHANA SOOMAR, hereby declare that the work on which this dissertation/thesis is based is my original work (except where acknowledgements indicate otherwise) and that neither the whole work nor any part of it has been, is being, or is to be submitted for another degree in this or any other university.

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TABLE OF CONTENTS

List of tables

List of figures

Definitions

Sexual violence

Any unwanted or forced sexual act, an attempt to obtain sexual act, unwanted sexual comments, advances or acts to traffic or otherwise directed against a person's sexuality using coercion by any person regardless of their relationship to the victim (Jewkes *et al,* 2001).

Sexual coercion

Multiple forms of manipulation leading to non-consensual sex. These would include verbal sexual abuse, forced viewing of pornography, unwanted touch or fondling, attempted rape, forced sex, trafficking, forced prostitution, physical force, blackmail, deception, forced substance use, threats of abandonment and withholding economic support (Finger, 2004).

Sexual debut / sexual initiation

An individual's first experience of penetrative sexual intercourse.

Sexual risk behaviour

Sexual acts which increase the individual's or sexual partner's risk of contracting HIV, or other STI's and pregnancy. Sexual risk behaviour could include early sexual activity, multiple consensual sexual partners, and non-use of condoms (Ganju, 2004).

Substance use

The consumption of any amount of alcoholic beverages, cigarettes or illegal drugs.

Physical abuse

Any form of physical harm, such as beating, hurting with an object or forced penetrative sex of another person, or being a victim of such physical harm.

Summary

Background

Sexual coercion results in psychological effects that may influence decisions made by adolescents' around sexual behaviours and other risk behaviours. The aim of this mini-dissertation was to assess whether sexual coercion at first sex predicts risk behaviours in a sample of school going adolescents by reviewing existing literature and examining a study of youth in Cape Town, South Africa.

Methods

Systematic review

The systematic review appraised literature which aimed to assess the influence of sexual coercion on risk behaviours. The selection criteria included quantitative observational studies and studies with subjects that were sexually active males and females between 10 and 25 years of age. Articles were obtained from the databases; 'Science direct', 'Google scholar', 'PsychINFO' 'Pubmed NCBI', and The University of Cape Town ('Aleph') library database. Results from the studies selected were collated and analysed. The selection of studies were validated by an external researcher and quality of each study assessed. Prevalence measures, measures of association and statistical significance were reported.

Data analysis

A secondary statistical analysis of data from the SATZ project was carried out to further assess the extent to which coercion at first sex predicts; sexual risk behaviour, experience or perpetration of physical abuse and substance use. A sample of 1136 (730 males, 406 females) sexually active, grade 8 learners in the Cape Town panel control group was analysed. The study was a large multi-site prospective panel study including a survey based, cluster-randomised control study. The data collected was statistically analysed using multilevel mixed-effects logistic modelling. Odds ratios were interpreted as the odds of the risk behaviour outcomes reported at follow-up, given that the participant was coerced at first sex which was reported at baseline and/or follow-up.

Results

Twenty-two articles were found relevant to this systematic review. The prevalence range for sexual coercion differed between males (range 0.2%; 26.7%) and females (range 4%; 48%). Seven studies indicated increased odds of later sexual risk behaviour if ever coerced into sex. The odds ratios ranged from 1.21 to 1.98 and all were statistically significant ($p<0.05$). Among the studies that reported statistically significant results, strong positive associations were presented between sexual coercion and physical abuse in 2 studies and between sexual coercion and substance use in 3 studies. The 15 other studies did not present any statistically significant results but showed a trend towards increased odds of risk behaviours. It was also found that sample definition, exposure and outcome definition, and temporality were factors which influence bias of the results.

The statistical analysis shows there is no statistically significant association between coercion at first sex and the specific risk factors among the study sample of school going adolescents in Cape Town. A general trend was noted, with increased odds of some sexual risk behaviours and physical abuse victimisation if coerced at first sex. Factors such as missing data, temporality and sample effect had a large influence on these results and as a result the outcomes were found unreliable. Even though not statistically significant the trends in results correspond with the findings of previous research.

Conclusion

In conclusion, the results from the systematic review indicate an association between sexual coercion and later risk behaviours. However, both the systematic review and statistical analysis show there is a need for improved quality of cross sectional and longitudinal studies which address the relationship between coercion and risk behaviour, and specifically an increased number of studies with longitudinal and experimental designs. This report is useful information for the effectiveness of programmes that aim to prevent risk behaviours. It indicates the need to address the consequences of sexual coercion, and promotes interventions that reduce the extent of sexual coercion

which may have added benefit in terms of reducing sexual risk behaviour, physical abuse victimisation and substance use.

CHAPTER 1

Introduction

1.1 Sexual coercion

Sexual coercion is a health issue, affecting mainly women and children. A secondary concern is that sexual coercion creates increased vulnerability to HIV among women and children.

It is said that in South Africa alone, a sexual crime is committed every 20 seconds (www.worldbank.org). The prevalence of sexual coercion has been reported to range from 4.3% to as high as 23% among females in South Africa (Jewkes and Abrahams, 2002; Manzini, 2001; Pettifor *et al*, 2003). Nevertheless, due to the poor reporting of cases of sexual coercion the true extent of the problem fits an 'iceberg model' (Jewkes and Abrahams, 2002). It is widely accepted that the reported cases "represent only the tip of the iceberg" which means there is a large number of unreported (submerged) cases (Koss, 1992; Jewkes and Abrahams, 2002). Studies have found that the fear of not being believed, fear of being ostracised, fear of the perpetrator retaliating, or fear of poor treatment by the police are the main reasons for not reporting cases of sexual assault (CIET Africa, 1998; Sable *et* al, 2006, Stanton, 1993).Other reasons for underreporting include poor police file management or corruption, and differences in personal definitions of sexual coercion (CIET Africa, 1998; Koss, 1992; Sable *et* al, 2006, Stanton, 1993). As a result, one can predict the true prevalence of sexual coercion to be much higher than what is published.

1.2 The risk factors

Gender power imbalance, which is found at varying extents in all societies, translates into a power imbalance in sexual interactions (Dunkle *et al*, 2004; Jewkes and Abrahams, 2002). These power imbalances are said to be a result of hegemonic masculinity where males assume a dominant role within gender hierarchy. The aggressive control over women and ideal of entitlement among males is said to manifest in forms of sexual violence against women (Jewkes and Abrahams, 2002).

In developing countries, in particular, there are great gender power inequalities. For example, in a South African study it was found that less than 50% of females (aged 18-49 years) believed that a married woman could refuse sex from her husband (Jewkes *et al,* 2002a). A Kenyan study showed 69% of male (n=214) and 49% of female (n=267) students agree to the statement “males are usually unable to control their sexual desires and this is why they coerce girls” (Ajuwon *et al*, 2001). The study also indicated that 92% of females but only 58% of males agreed that male sexual coercion of girls is wrong (Ajuwon *et al*, 2001). In addition, Ganju (2004a) presented a report of studies related to such inequalities and the extent of sexual violence among females and adolescents in developing countries. It summarised that young people are the most vulnerable and sexual coercion has a negative influence on sexual behaviour as well as sexual and psychosocial health. The risk factors for experiencing sexual coercion function at different levels. These levels include environmental, community, individual, and psychological and/or clinical levels. In South Africa

sexual violence has been proposed to be a reflection of the stress brought about by the environmental factor of severe poverty. Moreover, poverty may reduce the ability to protect oneself or may influence stress that would provoke such violence. Community level risk factors would include peer/family influences, as well as social and cultural norms (Jewkes *et al,* 2002b). Individual level risk factors for being a victim of sexual violence include; unstable childhood environments characterised by marital discord, and rejecting, violent or abusive parents (Dunkle *et al*, 2004, Dunkle *et al*, 2006). In addition to these Jewkes *et al* (2002b) described age, substance use, previous sexual violence, multiple sexual partners, and education level to be risk factors for experiencing sexual violence. Psychological and clinical factors would include psychological problems and substance abuse (Jewkes *et al,* 2002b). These levels of risk are interlinked and one level could influence the extent of another. These factors are not only risks for victimisation but perpetration of sexual violence as well (Jewkes *et al,* 2002b).

1.3 The outcomes and impacts

At a broad perspective sexual coercion may impact on society in that it creates added health costs for the individual and government. Furthermore, it results in a decrease in productivity and employment for the victims and perpetrators (WHO, 1997). Sexual coercion may affect the individual through multiple short and long term medical, emotional, psychological and social consequences. These outcomes could include HIV, or other STI infections, pregnancy, unsafe abortion, chronic pelvic pain, genital injuries, pelvic fistulae, urinary tract

infections, post traumatic stress disorder, depression, suicide, and homicide (Finger, 2004, Jejeebhoy & Bott, 2005). These outcomes are risk factors for further health issues. For instance those who have experienced sexual coercion have a higher risk of later re-victimisation or becoming perpetrators themselves (Koenig, 2004). The psychological effects of early sexual abuse or coercion may have a great impact on adolescent decision making around sexual activity and other risk behaviours (Ganju, 2004b). Hence, it is of importance that sexual coercion be approached as a risk factor for STI and HIV infection, and in turn be considered in HIV/AIDS intervention planning.

1.4 Sexual coercion at first sexual intercourse

In relation to sexual coercion there is a more specific issue to be addressed. Sexual debut has a pivotal influence on later sexual behaviour. Therefore effects of sexual coercion at first sexual intercourse should be assessed (Pettifor *et al*, 2004).

Sexual debut at 15 years old or younger has been found to be a risk factor for multiple sexual partners and HIV infection (Pettifor *et al*, 2004, Drain *et al*, 2004). Those that experience early sex are less likely to use condoms consistently, increasing the risk of HIV transmission (Pettifor *et al*, 2005). Mathews *et al* (2008) also identified that early sexual debut is a risk factor for other subsequent sexual risk behaviour. Moreover, this study found that physical violence in intimate relationships was a predictor of earlier first sexual intercourse. Additionally these individuals were more likely to have reported having been coerced into sex.

When considering first sexual intercourse, the circumstances of the debut are likely to impact on later sexual risk behaviour. If early sexual debut alone predicts risk behaviour one could predict that a forced first sex would have a greater negative impact. Assessing the circumstances surrounding first sex and its relationship to individual sexual behaviour would identify specific foci needed in interventions.

1.5 Conclusion

It is clear that sexual coercion of adolescents is an important health concern. Few studies specifically assess a relationship between sexual coercion at first sex and later risk behaviour. This mini-dissertation will be a new source of such information. Both a systematic review and statistical analysis of a specific study were used to identify the relationship between sexual coercion at first sex and subsequent sexual risk behaviour in adolescents, comparing both males and females. In addition the association between sexual coercion and subsequent physical abuse and substance use was examined.

1.6 Study Aim

The aim of this mini-dissertation is to assess whether sexual coercion at first sexual intercourse predicts sexual risk behaviour, experience of physical abuse and perpetration of physical abuse, and substance use.

1.7 Objectives

1) To undertake a systematic review of literature which investigates the influence of sexual coercion on sexual risk behaviour, experience of physical abuse and perpetration of physical abuse, and substance use.

2) To assess, among grade 8 adolescents in Cape Town, South Africa the extent to which coercion at first sex predicts:

a. sexual risk behaviour,

b. experience of physical abuse,

c. perpetration of physical abuse, and

d. substance abuse

Objective 1 is addressed in Chapter 2 and objective 2 in Chapter 3.

CHAPTER 2

Systematic literature review

2.1 Introduction

Chapter 1 broadly presents the issue of sexual coercion. It also draws out the gap in research around the topic, specifically sexual coercion at first sexual intercourse, and its association with subsequent risk behaviours in South Africa. Chapter 2 presents a systematic review undertaken to investigate the relationship between sexual coercion and subsequent sexual risk behaviour, substance use, and physical abuse perpetration or victimisation.

A systematic review compared to the standard literature review is a more comprehensive method of reviewing studies. Systematic reviews aim to reduce the influence of bias through summarising and reporting studies on a specific topic. This is achieved in four procedures:

- Formulating an explicit research/review question.
- Following systematic methods to identify, select, and appraise relevant research.
- Systematically collect and analyse the research.
- In some reviews, statistical methods are used to analyse and summarise similar results from the selected research (www.mrc.co.za).

This systematic review which includes only observational studies summarises research related to sexual coercion and its influence on risk behaviours. The

method of developing this review started with formulating a specific review question which summarised the exposure, outcomes and population to be investigated. Thereafter, published research relating to the research question was obtained by searching multiple sources with specific search terminology. The selected studies were appraised according to a detailed selection criterion. Data was then extracted from the studies selected and the quality of each study assessed. The results of this review are presented in this chapter.

2.2 Methods

2.2.1 Review question

Does sexual coercion predict sexual risk behaviour, substance use, and physical abuse perpetration/victimisation among adolescents?

2.2.2 Criteria for considering studies for this review

2.2.2.1 Types of studies

Only observational studies were included. Quantitative studies or qualitative studies with quantitative components were included in the review.

2.2.2.2 Types of participants

Studies where the participants were sexually active heterosexual and/or homosexual males and females between 10 and 25 years of age were included.

2.2.2.3 Exposure measure

For the review, it was necessary that the study included an assessment of experience of any form of sexual coercion as the exposure to be included,

where sexual coercion was interpreted as having been tricked into sex, or forced into sex, or raped. In addition, a comparison group of participants that did not experience sexual coercion was necessary. The time of exposure was defined as being any time during the participants' life (ever) or specifically at first sexual intercourse.

2.2.2.4 Outcome measures

The primary outcome measure assessed in the studies were the association of sexual coercion (ever or at sex debut) with sexual risk behaviour, and/or physical abuse perpetration and victimization, and/or substance use. The secondary outcome assessed was the prevalence of sexual coercion.

2.2.3 Search methods

Published peer reviewed paper-based and electronic articles were included in the systematic review search. The article search did not restrict articles according to published year due to the limited number of articles on the topic and due to the fact that this topic has been addressed in the research literature only in recent decades. The following electronic databases were searched: 'Science direct', 'Google scholar', 'PsychINFO' and 'Pubmed NCBI'. The University of Cape Town ('Aleph') library database was also used to find paper-based articles or books. Additionally the reference lists of articles found were scrutinised for other articles of interest. The search terms used in the searches were; 'sexual coercion', 'forced sex AND risk behaviour', 'forced sex initiation', 'sexual debut', 'risk behaviour AND sexual coercion OR sexual abuse OR forced sex OR rape'. There were no language exclusions.

2.2.4 Data collection and analysis

2.2.4.1 Study selection

The titles and abstracts of all articles found were used to identify the relevance of each study. The study criteria described in section 2.2.2 were used to select the abstracts and full texts. For all abstracts deemed to be relevant, the full text articles were accessed and further appraised. An external researcher assisted with validating the selection of articles from the search results. This is further described in section 2.2.4.4 (Study validation).

2.2.4.2 Data extraction

The characteristics presented in Table 2.1 were used to extract information from the articles. The data were extracted into 6 categories and the specific information collected for each category are listed under the heading extracted characteristics.

Table 2.1 Summary of characteristics extracted for article appraisal

No.	Data category	Extracted characteristics
1	*Administrative details*	- Referencing details - Time of study - Place of study
2	*Study methodology*	- Study design - Sample selection - Follow-up period (for longitudinal studies)
3	*Characteristics of participants*	- Number of participants - Source of participants - Gender - Age-group - Sexual activity - Occupation
4	*Details of exposure*	- Exposure measurement method - Prevalence of exposure
5	*Details of outcomes*	- Outcomes measurement method for measuring sexual risk behaviour, physical abuse perpetration and victimisation, and substance use. - Measures of associations with exposure
6	*Data analysis*	- Prevalence measure of sexual coercion (ever or at sexual debut) - Odds ratios (crude and/or adjusted) for all association measures of outcomes and exposure - 95% confidence intervals for all statistical measures

2.2.4.3 Data quality

At present there is no universal tool for assessing the quality of observational studies (Mallan *et al,* 2006). Assessment tools such as the MOOSE (meta-analysis of observational studies in epidemiology) guidelines and the STROBE (standards for reporting observational studies) statement have commonly been used. However, these detailed tools are designed for extensive appraisal of

articles and covers a broader area than just the quality of the articles (Stroup *et al,* 2000; Mallan *et al,* 2006). In Mallan *et al* (2006), it was found that among most systematic reviews including observational studies the researcher devised a unique tool for each review. A suggested criterion of quality assessment of observational studies has been described in Khan *et al* (2001) and Mallan *et al* (2006). A concise format which addressed all areas recommended in these articles was found in Siegfried *et al* (2003) and it was adapted as a quality assessment tool for use in this review (Table 2.2).

The quality assessment tool included a list of questions covering areas of potential bias which could have negatively influenced the validity of each study's results. This includes sources of external and internal bias. Those questions relevant to longitudinal and/or cross sectional studies are marked in the tick columns of Table 2.2. The external validity includes areas where the sampling method and sample itself could influence the generalisability of the results of the study. Internal validity looks at performance, detection, attrition, and selection bias. These assess how measurement and reporting tools and loss to follow-up influence deviation of the results from its true values.

For each study the relevant questions were asked. If the area of bias addressed by the question was adequately presented in the study then the response was positive. The response for each question and each study was recorded and tabulated. For example, if a study population *cannot* be interpreted as representative of the general population then the response to question 1.2 in Table 2.2 would be 'no'. Studies which are highly biased would have more

negative responses, whereas more positive responses would indicate a study has less bias and hence be of a higher quality.

2.2.4.4 Study validation

The selection of the studies was validated by an external researcher. All abstracts obtained using the search methods described in section 2.2.3 were then appraised using the study selection criteria in section 2.2.2. The external researcher also appraised the abstracts independently. The studies selected by the external researcher for the review were compared to the candidate's selection. Where conflicting opinion of study inclusion arose the study review was repeated. Differences in reasons for inclusion or exclusion of a study were assessed and the study was re-evaluated using the inclusion criteria. A final selection of studies to be included in the review was then determined by the candidate.

Table 2.2 Quality assessment tool listing questions used to critique quality of articles (adapted from Siegfried *et al,* 2003)

No.	Quality assessment question	Cohort	Cross-sectional
1	*External validity*		
1.1	Was the sample selected by census, consecutive or random selection?	✓	✓
1.2	Was the sample representative of the general population?	✓	✓
1.3	Was the percentage of selected participants who agreed to participate more than 80%?	✓	✓
2	*Internal validity*		
Performance bias			
2.1	How was the measure of sexual coercion ascertained? Did the measure include the actual words 'force', 'threatened', and/or 'rape'?	✓	✓
2.2	Were the assessors of sexual coercion blinded to outcomes responses?	N/A	✓
Detection bias (difference in outcomes assessment)			
2.3	How was sexual risk measured? Did the measurement item include the terms 'age at first sex', 'number of sexual partners', 'STI symptoms', 'pregnancy', 'condom use', and 'transactional sex'.	✓	✓
2.4	How was physical abuse perpetration and victimisation measured? Did the measurement item include the terms 'perpetrate forced sex', 'in a fight', 'physically hurt/hit/punched someone/by someone', or 'used a weapon to harm/hurt someone/by someone'	✓	✓
2.5	How was substance use measured? Did the measurement item include the terms 'alcohol', 'cigarettes', or 'marijuana'.	✓	✓
2.6	Were the assessors of outcomes blinded to sexual coercion responses?	✓	✓
Attrition bias			
2.7	Was the follow-up time adequate for identifying exposures/outcomes?	✓	N/A
2.8	Was the percentage of selected participants included in the final analysis more than 80%?	✓	✓
Selection bias			
2.9	Was there report of participants' exposure at the start of the study?	✓	N/A
2.10	Were confounders accounted for? (age, socio-economic status, location, other)	✓	✓

N/A – Not applicable

2.2.4.5 Data synthesis

Information on study characteristics and quality assessment was summarised and presented in tables. Figures 2.1 to 2.6 depict the odds ratios for measures of association between sexual coercion and risk behaviours were presented as simplified forest plots stratified by gender, experiencing sexual coercion at sexual debut or experiencing sexual coercion ever in subject's lifetime. The author name, sexual coercion measure and sample size were presented alongside the odds ratio.

All 95% confidence intervals were presented, or calculated where necessary. The confidence intervals represent the precision of each odds ratio measure at a 95% level of significance. In some instances there was insufficient information to calculate and present confidence intervals. However, if p-values were presented, then *dummy confidence intervals* were presented to depict a statistically significant or not significant relationship, but these are not true values and do not present precision. For example, if an article presented an odds ratio with no confidence interval, but only a p-value of more than 0.05, then a dummy confidence interval would be presented with the odds ratio which includes the value 1 to indicate that the odds ratio is not statistically significant. Or if the p-value was less than 0.05 a narrow interval excluding the value 1 would be presented in the forest plot. These intervals do not depict precision and are not valid confidence intervals. The dummy confidence intervals are merely a representation of a p-value less than or more than 0.05.

2.3 Results & Discussion

2.3.1 Study selection

The article search yielded 1308 articles, of which only 22 were found relevant according to the selection criteria (section 2.2.2). Studies were excluded if they included only qualitative results, if they did not include sexually active participants, if the participants did not fall within the age group 10-25 years, and if they did not measure sexual coercion as an exposure. The study characteristics are summarised in Table 2.3. As there was no exclusion according to study design both longitudinal and cross-sectional studies were included. A total of 2 longitudinal and 20 cross-sectional studies were included. Five of the included studies were set in South Africa, 5 in other African countries and 12 non-African countries (American, European, Asian, or Australian). All of the studies included participants between 10 and 25 years of age with varying gender ratios. Ten studies included females only, and 12 included both male and female participants. Most of the studies included the word 'force' when measuring coercion, however there were a few where the vocabulary varied and words such as 'not willing', 'persuaded' and 'tricked' were used. Seventeen of the 22 studies reported the prevalence of sexual coercion in the study populations. These too are presented in Table 2.3. Ten of the studies specifically investigated coercion 'at first sex' (Table 2.3), while 13 investigated ever experiencing coercion. This table illustrates with ticks (✓) where analysis on associations between sexual coercion and sexual risk, physical abuse, and substance use were carried out.

Table 2.3 Summary of characteristics of all studies included in the review

Source	Country	Participants*	Sample size		Study period**	Follow-up time	Coercion question	Coercion prevalence (%)		Analysis				
										Coercion at 1st sex	Coercion ever	Sexual risk	Physical abuse	Substacne use
Longitudinal studies:								M	F					
Dickson 1998	New Zealand	Males and females, birth cohort, at age 21 yrs	1020	(413 males, 419 females)	1972-present	18 and 21 years	Not reported. Terms used include 'forced first episode of intercourse'.	0.2	7	✓				
Koenig 2005	Uganda	Adolescent women, aged 15-19 yrs from rural communities located on secondary roads	575		1987-present	15 years	Was force used the 1st time you had sex? How willing were you to engage in sex the 1st time?	N/A	14	✓		✓		
Cross-sectional studies:														
Afenyadu 2003	Ghana	Adolescents boys and girls, aged 15-20 yrs from schools	398	(203 males, 195 females)	N/D	N/A	Not reported. Terms used include 'ever forced to have sex'.	N/D	33		✓			
Basile 2006	USA	Male and female students in grade 9-12 from high schools	13080	N/D	4 months	N/A	Have you ever been physically forced to have sexual intercourse when you did not want to?	6.1	11.9		✓		✓	✓
Caceres 2005	Peru	Hetero and homosexual males & females, aged 16-17 & 19-30 yrs from military registration records and persons requesting police certificates for permits	1218	(617 males, 601 females)	2 years	N/A	Did you feel pressured to have your 1st sexual relationship? Did you ever have sex with a boy/girl because he/she pressured you to do it?	11	40	✓		✓		
Dunkle 2004	South Africa	Women aged >16yrs seeking antenatal care at a clinic in Soweto and elected to have an HIV test	1366		5 months	N/A	Not reported. Terms used include 'physically forced to have sex'.	N/D	N/D		✓	✓		✓
Erickson 1991	USA	Middle and high school students in grade 6-12	549		1 month	N/A	Did you ever have a sexual experience/sexual intercourse with some one when you did not want to?	8	31		✓			
Erulkar 2004	Kenya	Male and female, aged 10-24 yrs from households	799	(337 males, 462 females)	~ 1 year	N/A	Has anyone ever tricked you, threatened, insisted, locked you in room, physically forced you to have sex, or raped you?	1	5		✓	✓		✓

* All participants sexually active or sexually experienced, ** Period of data collection. Does not include planning, analysis and reporting.

~ Approximate study period, year of study period given but not clear that full year used for study

N/A: not applicable, N/D: no data presented in article

Table 2.3 Continued. Summary of characteristics of all studies included in the review

Source	Country	Participants*	Sample size		Study period**	Follow-up time	Coercion question	Coercion prevalence (%)		Analysis				
										Coercion at 1st sex	Coercion ever	Sexual risk	Physical abuse	Substacne use
Cross-sectional studies:								M	F					
Halcon 2003	Antigua, Bahamas, Barbados, British virgin islands, Dominica, Grenada, Guyana, Jamaica, St Lucia	Teenagers, aged 10-18 yrs at schools	15695	(6121 males, 9574 females)	N/D	N/A	Was your 1st intercourse forced?	N/D	48	✓				
Im-em 2005	Thailand	Women aged 15-24 years from households in villages and urban wards	2817		~ 1 year	N/A	How would you describe the 1st time you had sex? Would you say that you: wanted to have sex/ did not want to have sex but it happened anyway/ forced to have sex	N/A	8	✓				
Jewkes 2002	South Africa	Females aged 15-49 yrs	11735		N/D	N/A	Have you everbeen forced/persuaded to have sex against will?	N/D	4.3		✓			
Lottes 1996	USA	Coitally expereinced women aged 20-22 years at university	276		~1 year	N/A	Has a male ever physically forced you to be able to engage in sexual intercourse?	N/D	15		✓			
	Sweden		338					N/D	4		✓			
Maharaj 2006	South Africa	Females aged 14-24 yrs from households	1130		3 months	N/A	Participant requested to read different statements and asked which one best describes the 1st sexual intercourse. 'Force' included as an option.	N/A	N/D	✓		✓		
Manzini 2001	South Africa	Adolescent girls, aged 14-22 yrs	796		6 weeks	N/A	Was the 1st sexual experience undertaken willingly, through persuation, trickery, force or rape?	N/A	10	✓				
Moore 2007	Burkina Faso, Ghana, Malawi, Uganda	Females, aged 12-19 yrs from households	19279		N/D	N/A	Thinking about the 1st time you had sexual intercourse, would you say you were willing, somewhat willing, not willing at all?	N/D	N/D	✓				

* All participants sexually active or sexually experienced, ** Period of data collection. Does not include planning, analysis and reporting.

~ Approximate study period, year of study period given but not clear that full year used for study

N/A: not applicable, N/D: no data presented in article

Table 2.3 Continued. Summary of characteristics of all studies included in the review

Source	Country	Participants*	Sample size		Study period**	Follow-up time	Coercion question	Coercion prevalence (%)		Analysis: Coercion at 1st sex	Analysis: Coercion ever	Analysis: Sexual risk	Analysis: Physical abuse	Analysis: Substance use
Cross-sectional studies:								M	F					
Njue 2005	Kenya	Males and females, aged 10-19 yrs from households	3522	(951 males, 2571 females), only 182 males sex. active	N/D	N/A	The first time you had sexual intercourse did you: want to have sex / was sweet-talked / was convinced to have sex with gifts/money / was tricked / was threatened / was forced (physically) / no response	4	16	✓			✓	
Pettifor 2003	South Africa	Adolescents, aged 15-24 yrs from households (randomly selected from census maps)	11904	(5687 males, 6217 females)	6 months	N/A	How much would you say you wanted to have sex the very 1st time you ever had sex?	N/D	23	✓				
Shrier 1998	USA	Students in grade 8-12 from schools	7884	(3953 males, 3931 females)	~ 1 year	N/A	Have you ever been forced/pressured to have sex?	N/D	N/D		✓	✓	✓	✓
Senn 2007	USA	Men and women attending public STD clinic in New York of an average age of 29 yrs	1200	(653 males, 557 females)	N/D	N/A	Not reported. Terms used include 'sexual abuse with penetration, or penetration and force'.	17	35		✓			
Tubman 2001	USA	Drug abusing adolscents and young adults, men and women, aged 13-21 yrs	120	(87 males, 33 females)	N/D	N/A	Have you ever been forced to have sex when you did not want to?	26.7			✓			
Upchurch 2004	USA	High school girls, aged 12-21 yrs from high schools	3579		~ 1 year	N/A	Were you ever physically forced to have sexual intercourse against your will?	20.3			✓	✓		
Wang 2007	China	Female sex workers from entertainment establishments, aged 18-28 yrs	454		3 months	N/A	Have you ever been forced into sex against your will in the last 6 months?	N/A	N/D		✓			

* All participants sexually active or sexually experienced, ** Period of data collection. Does not include planning, analysis and reporting.

~ Approximate study period, year of study period given but not clear that full year used for study

N/A: not applicable, N/D: no data presented in article

2.3.2 Study quality

The results of the quality assessment of the studies are depicted in Table 2.4. The table summarises the assessment using ticks to represent where the measure was adequately addressed in the study. A blank response represents either poor quality of the measure, lack of clarity regarding quality, or absence of measure description.

2.3.2.1 External validity

Only 7 of the studies clearly indicated that random sample selection was used (Koenig *et al,* 2005; Caceres, 2005; Erulkar, 2004; Im-em *et al*, 2005; Jewkes and Abrahams, 2002; Manzini, 2001; Njue *et al*, 2005). When interpreting the results of the other 15 studies their weaker generalisability was taken into account. Additionally in 3 studies (Senn *et al,* 2007; Tubman *et al,* 2001; Wang *et al,* 2007) the participants were selected from high risk groups, reducing their generalisability. One of these studies included clients visiting an STI clinic, another included drug abusers, and the third included sex workers. Caceres (2005) was considered a poor representation of the population, because participants were selected only from military records and records of police certificate requests.

2.3.2.2 Attrition bias

Attrition bias was largely unreported in the selected studies. Table 2.4 shows that in 8 studies, more than 80% of those sampled agreed to participate

(Dickson *et al,* 1998; Dunkle *et al,* 2004; Erulkar, 2004; Im-em *et al*, 2005; Manzini, 2001, Pettifor *et al,* 2004; Senn *et al,* 2007; Shrier *et al,* 1998). The loss to follow-up indicator for quality was often not described in the articles and as a result no assessment could be made for 19 of the 22 studies. A clear report of more than 80% of the selected participants being included in the final analysis was found in only 1 study (Dunkle *et al*, 2004). None of the other 21 studies reported this measure of attrition hence a conclusion on this bias cannot be made.

2.3.2.3 Detection bias

The sexual coercion variables were described variably across studies. However, all studies included one or more of the expected terms (forced, tricked, or raped). The combination of outcomes measures (sexual risk, physical abuse and substance abuse) differs broadly between studies. Among those that report the same outcomes there are further possible differences between the measures of the outcome. For example measures of sexual risk behaviour may include 'condom use', 'unwanted pregnancy', and 'number of sex partners'.

2.3.2.4 Selection bias

Both the longitudinal studies were birth cohorts (Dickson *et al,* 1998, Koenig *et al*, 2005). Thus, there was no baseline prevalence of sexual coercion and there was no report of past prevalence measures. Another quality measure noted was that most of the studies that present associations or prevalence do take confounders into account.

The final bias that is not presented in this table but is a known limitation in cross-sectional studies is temporality. None of cross-sectional studies indicate whether the outcomes occurred after the exposure and it has been reported as a limitation in these articles.

In summary, Table 2.4 shows that the studies found to have higher quality were those with a greater number of acceptable outcomes in the assessment (ticked). These studies are likely to have minimized performance, detection, attrition, and selection bias. However, a study's quality may well be poorly presented in the articles. As mentioned above, when interpreting cross-sectional studies the main concern is that of temporality. This bias, in addition to the other biases stated, would result in misleading predictions.

Table 2.4 Study quality assessment results presenting adequate quality assessment where areas are ticked

	(a) External Validity			(b) Internal validity									
				Performance bias		Detection bias				Attrition bias		Selection bias	
Study	**1.1**	**1.2***	**1.3**	**2.1**	**2.2**	**2.3**	**2.4**	**2.5**	**2.6**	**2.7**	**2.8**	**2.9**	**2.10**
Cohort studies:													
Dickson 1998		✓	✓	✓		✓				✓			
Koenig 2005	✓	✓		✓		✓				✓			✓
Cross-sectional studies:													
Afenyadu 2003		✓		✓									✓
Basile 2006		✓		✓			✓	✓					
Caceres 2005	✓					✓		✓					✓
Dunkle 2004			✓	✓				✓			✓		✓
Erickson 1991		✓				✓		✓					✓
Erulkar 2004	✓	✓	✓	✓		✓		✓					✓
Halcon 2003		✓		✓									
Im-em 2005	✓	✓	✓	✓		✓							✓
Jewkes 2002	✓	✓		✓									✓
Lottes 1997	✓			✓						✓			
Maharaj 2007		✓		✓		✓							
Manzini 2001	✓	✓	✓	✓									✓
Moore 2007		✓				✓							✓
Njue 2005	✓	✓		✓		✓	✓						✓
Pettifor 2003		✓	✓										✓
Senn 2007			✓	✓		✓							✓
Shrier 1998		✓	✓	✓		✓	✓	✓					✓
Tubman 2001				✓		✓							
Upchurch 2004		✓		✓		✓		✓					✓
Wang 2007				✓		✓							✓

* May be representative for specific population and not necessarily general population, e.g. females only or in specific area

(a) Areas where the sampling method and sample itself could influence the generalisability of the results of the study satisfactorily assessed

(b) Areas where measurement and reporting tools and loss to follow-up influence deviation of the results from its true values of the study satisfactorily assessed

2.3.3 Sexual coercion prevalence

Prevalence is the measure of the proportion of current cases (individuals that experienced the outcomes) in a population or sample. All prevalence values available from the studies included in the systematic review are presented in Table 2.3 which is described in section 2.3.1. The prevalence rates for the selected studies are highly variable even within developing (range 1%; 48%) or developed country settings (range 0.2%; 35%), but there does not appear to be much difference in prevalence between lifetime sexual coercion (range 4%; 33%) and sexual coercion at first sex (range 0.2%; 48%). However, there is a clear discrepancy between the genders, with females (range 4%; 48%) tending to have a higher prevalence of sexual coercion than males (range 0.2%; 26.7%). The higher prevalence is expected given females' greater vulnerability to sexual violence. A second discrepancy is between studies employing differing definitions of sexual coercion. In viewing the 'coercion question' column in Table 2.2, it is clear that certain questions are more specific than others. For instance some measures of exposure were defined as 'force, threatened, or rape' where others were broader, such as 'did not want, not willing, tricked, sweet-talked, or locked in room'. It is apparent that the broader the coercion definition, the higher the reported prevalence. This is because the broader the definition, the greater the number of people that could respond positively to the coercion question. Although this finding is obvious, it serves to reinforce the necessity of taking the definition of coercion into account when assessing prevalence rates. However, one needs to bear in mind the 'iceberg model' described in Chapter 1, which

postulates that much sexual coercion is unreported. This presents a research problem with no clear solution.

It would be of interest to further compare the difference in prevalence between foreign countries and South Africa. However, due to the small sub-sample of studies this is not possible. The South African studies that are included in this analysis were Manzini (2001), Jewkes *et al* (2002) and Pettifor *et al* (2003). Manzini (2001) reported a sexual coercion prevalence of 10% among females who had been 'forced, raped, or threatened' and a prevalence of 4% among the same group who had been 'tricked' into first sex. Jewkes *et al* (2002) found that 4.3% of females were *ever* 'forced, raped, or threatened', and Pettifor *et al* (2003) found 23% of females were 'not willing' at first sex. All of the studies include participants of the same ages, but Jewkes *et al* (2002) includes participants up to the age of 49 years. These prevalence measures give an estimate of the range for prevalence of sexual coercion (range 4-23%) expected among females in a South African setting. It shows that there is a gap in South African research where prevalence of sexual coercion among males could be assessed.

2.3.4 The associations between sexual coercion and risk behaviours

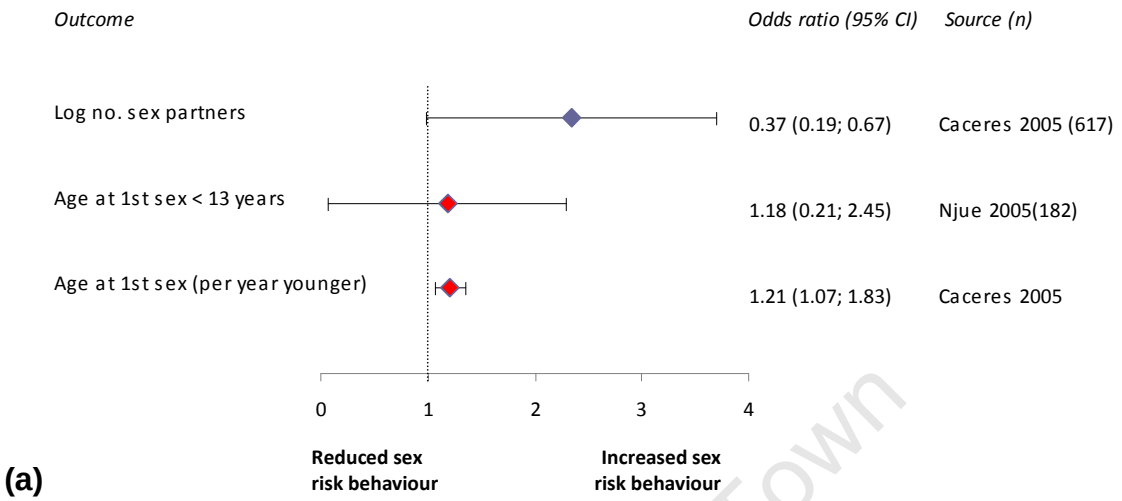
The associations between exposure and outcomes were presented as odds ratios or proportions in the articles. Where possible the odds ratios were calculated if proportions of the outcomes in each exposure group and sample size were available. This measure compares the ratios of outcomes and

absence of outcomes between exposed and non-exposed groups - without specifying that the exposure occurred before the outcome.

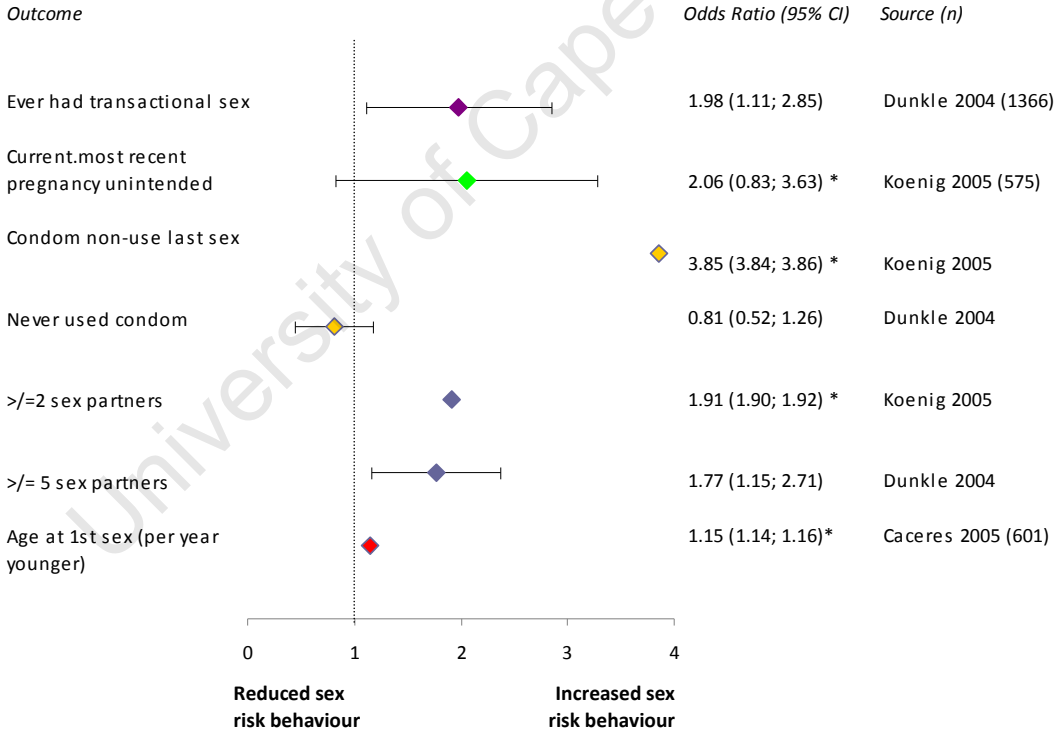
The odds ratios for measures of sexual risk behaviour, physical abuse and substance use were summarised in simplified forest plots. For each outcome the different indicators that measure a single outcome were grouped together and presented in a single forest plot. Since the indicator definitions varied they were not statistically compared.

Where necessary in order to standardise odds ratio direction of interpretation odds ratios were converted. For example odds ratios for ‘condom use’ were converted to be interpreted as ‘condom non-use’. The plots are stratified by gender and ‘ever’ being coerced or coerced ‘at first sex’. They are also grouped by outcome category and colour coded by type of outcome variable.

Studies with coercion at first sex or coercion ever in an individuals life-time, were interpreted separately and then compared. The same can be said for stratification by gender. Given that these results are from a diverse group of studies the results were then interpreted accounting for the coercion definition, coercion prevalence, study setting, study quality, and type of participants.



(a)



(b)

Figure 2.1 Forest plot depicting reported associations between experiencing sexual coercion at first sex and sexual risk behaviour among (a) males and (b) females (* dummy confidence interval)

2.3.4.1 Sexual behaviour outcomes associated with sexual coercion

Among studies that addressed sexual coercion at first sex of males, only *number of sex partners* and *age at first sex* was assessed. Females coerced at first sex included these variables in addition to *transactional sex*, *pregnancy* and *condom use*.

ASSOCIATION MEASURES

Age at first sex

Two studies reported *age at first sex.* The results in Figure 2.1 show that both males and females who have been coerced at first sex have increased odds to have had their first sexual experience at less than 13 years of age, or have increased odds of sex debut at an earlier age (Njue *et al*, 2005; Caceres, 2005).

Number of sex partners

The only other variable presented for both genders is *number of sex partners* presented by 3 studies. These results are similar between males and females. It appears that males and females coerced at first sex have an increased odds of having more sex partners. Females would more specifically have an increased odds of having more than 2 partners (Caceres, 2005; Dunkle *et al,* 2004). Nonetheless, there is an insufficient number of studies presented to draw a strong conclusion on these relationships.

Transactional sex

A single study was found that included females only, and it indicates that they have increased odds to have had transactional sex if coerced at first sex (Dunkle *et al,* 2004).

Pregnancy

One study assessed pregnancy as an outcome. Females were also found to have increased odds of pregnancy if coerced at first sex with an odds ratio as high as 2.05 ($p<0.05$) (Koenig *et al*, 2005). All the same, more study comparisons would be required to make a sound conclusion on these results.

Condom use

Two studies presented results on condom use. One found a decreased odds of using a condom if coerced at first sex (Koenig *et al,* 2005). This result is statistically significant, but no confidence interval was presented. Dunkle *et al* (2004) presented a contradictory association for condom use, which indicates that females have increased odds of using a condom if coerced at first sex.

INFLUENCE OF BIAS

The quality of the studies presented was appraised to assess the validity of the results.

Age at first sex

In assessing the quality of the studies it was found that the statistical significance of some of the results presented was questionable. For instance, the 2 significant results presented by Caceres (2005) only reported p-values ($p<0.05$) and no confidence intervals. The confidence intervals presented here are dummy intervals to depict the p-value, however they cannot give a clear idea of how precise the result may be.

The results are also likely to be influenced by forms of measurement and sampling bias. Firstly, Njue *et al* (2005) measures coercion at first sex by including the term *force* among multiple options to describe first sex, and Caceres (2005) defines coercion as being *pressured* into having sex. This would affect the prevalence measure of coercion and in turn associations will deviate from more generalisable values. Secondly, the sample sizes are much different, where Njue *et al* (2005) has a sample of only 182 compared to Caceres (2005) sample of 617 participants. Lastly, in addition to sample size only Caceres (2005) was reported to have selected the sample by random selection, but the sample was specifically selected from military registration records and police certificate requests. These factors could greatly affect the generalisability of the associations presented. These quality results introduce the need for a larger number of comparable studies.

Number of sex partners

The two studies Caceres (2005) and Dunkle *et al* (2004) which both present number of sex partners, are not comparable for this variable as Caceres (2005) presents results for males only while Dunkle *et al* (2004) present their results for females only. Their definitions of coercion vary from *forced* in Dunkle *et al* (2004) and *pressured* into sex in Caceres (2005). The participants too may be a strong source of bias, as the females selected by Dunkle *et al* (2004) are specifically from women attending antenatal clinic and requesting an HIV test. These results are less representative of the population than those presented in Caceres (2005). However, it can be hypothesised that the effect of coercion may differ between genders.

Transactional sex, pregnancy and condom use

Koenig *et al* (2005) presents sampling bias where the sample only includes participants between the narrow age range of 15 and 19 years. Also sample bias would influence this comparison of the sample of women seeking antenatal care in Dunkle *et al* (2004) as it is a sample of women seeking care and likely to have more access to condoms, exposed to more educated tools at the clinic, but are also from a specific poorer community, among other possible outcomes of this bias. Lastly, referring to the measures of condom use the odds ratio in Koenig *et al* (2005) cannot be specifically compared to that of Dunkle *et al* (2004) since the variables have very different definitions, *condom at last sex* compared to *never used a condom*.

SUMMARY

When considering all studies the results in Figure 2.1 suggests sexual coercion at first sex has negative influence on sexual behaviour among females. The results do not provide much support for this outcome among males. It can only be said that males coerced at first sex would more likely have had first sex at a younger age. There are still multiple factors that could negatively influence the validity of these results. A larger selection of comparable studies would be needed to draw a more generalisable conclusion. To further investigate the relationship between coercion and sexual risk behaviour Figures 2.2 and 2.3 present results from studies which assessed the influence of *ever* being coerced into sex and sexual risk behaviours.

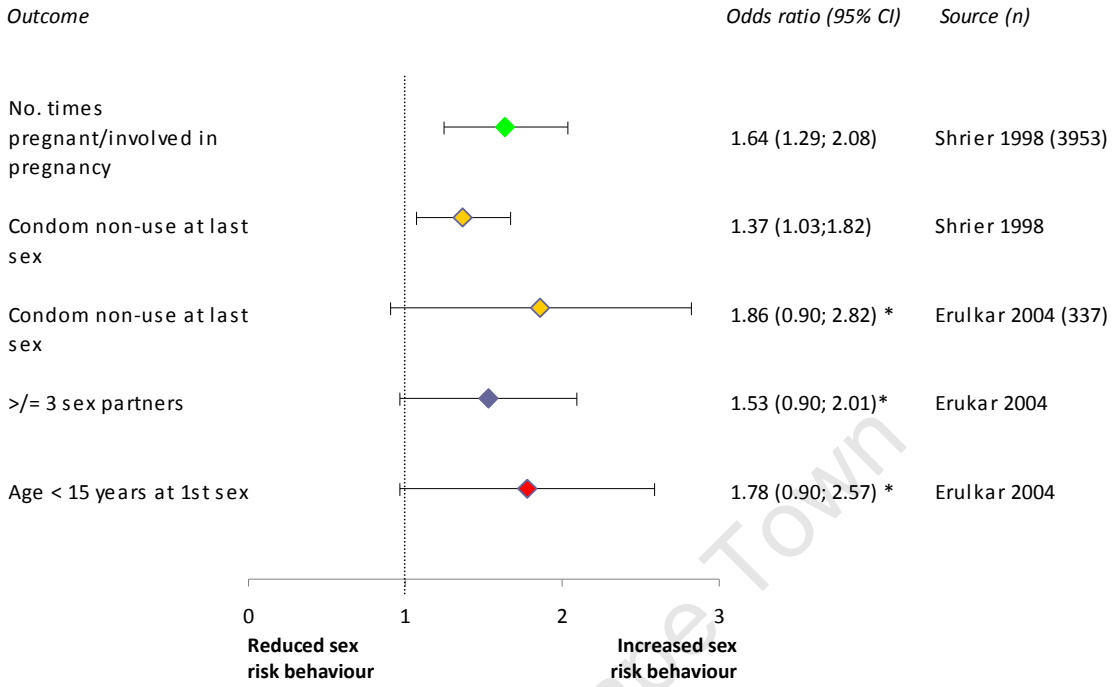


Figure 2.2 Forest plot depicting reported associations between ever experiencing sexual coercion and sexual risk behaviour among males (* dummy confidence interval)

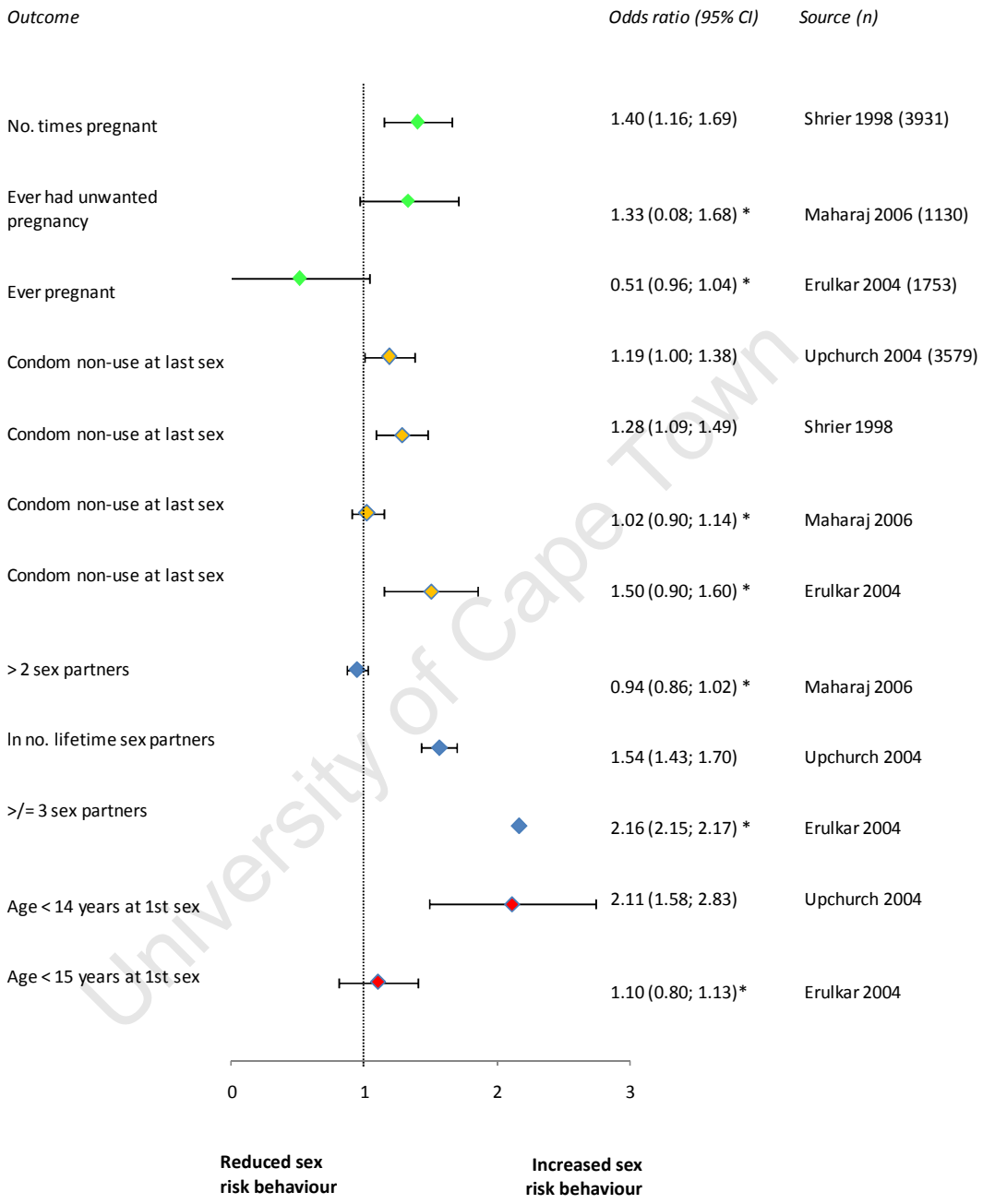


Figure 2.3 Forest plot depicting reported associations between ever experiencing sexual coercion and sexual risk behaviour among females (* dummy confidence interval)

Among the studies presented in Figures 2.2 and 2.3 that addressed males and females ever experiencing sexual coercion the variables *involvement in pregnancy, condom use, number of sex partners* and *age at first sex* were assessed.

ASSOCIATION MEASURES

Pregnancy

Three studies reported associations with pregnancy. Two results indicate that both males and females had a trend towards increased odds of ever being pregnant (or having made someone pregnant for males) if reporting ever being coerced into sex (Shrier *et al,* 1998; Maharaj *et al,* 2007). The results from Shrier *et al* (1998) were the only statistically significant results found for this variable, and the confidence intervals for these overlap, indicating little difference between genders. Erulkar (2004) however contradicts these results. The study indicates that females who have ever been coerced into sex tend to reduced odds of ever being pregnant (OR: 0.55, p>0.05). Since this value is not statistically significant it may not considered an influential result.

Condom use

Four studies reported associations with condom use. The results for condom use are consistent between males and females. Both genders have values close to 1 (range 1.02 – 1.86) which indicates a possible absence of association

(Shrier *et al*, 1998; Erulkar, 2004; Upchurch and Kusunoki, 2004; Maharaj *et al*, 2006).

Number of sex partners

Two studies, Erulkar (2004) and Upchurch and Kusunoki (2004) presented odds ratios ranging between 1.53 and 2.16 for *number of sex partners*, however only the results from Upchurch and Kusunoki (2004) are statistically significant. These results indicated a trend towards increased odds of having more sex partners if coerced at first sex. Maharaj *et al* (2007) presented a contradictory outcome which indicates that there is no association between the outcome and coercion at first sex.

Age at first sex

Studies by Erulkar (2004) and Upchurch and Kusunoki (2004) indicate that both genders have greater odds of early age at first sex if they had ever reported coerced sex. The results from Upchurch and Kusunoki (2004) are statistically significant and the odds ratio values tend towards a large positive value (range 1.10 – 2.11).

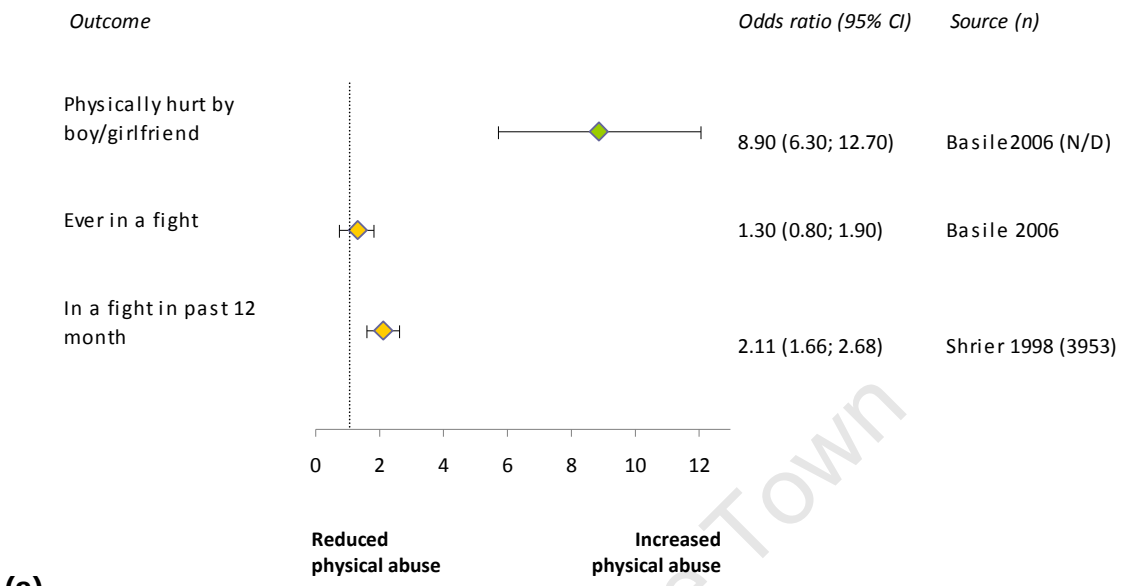
INFLUENCE OF BIAS

In assessing the qualities of the each study it was noted that the sample selection and setting would be the main factors suggestion potential bias in these results. Firstly, only one study (Erulkar, 2004) used random selection.

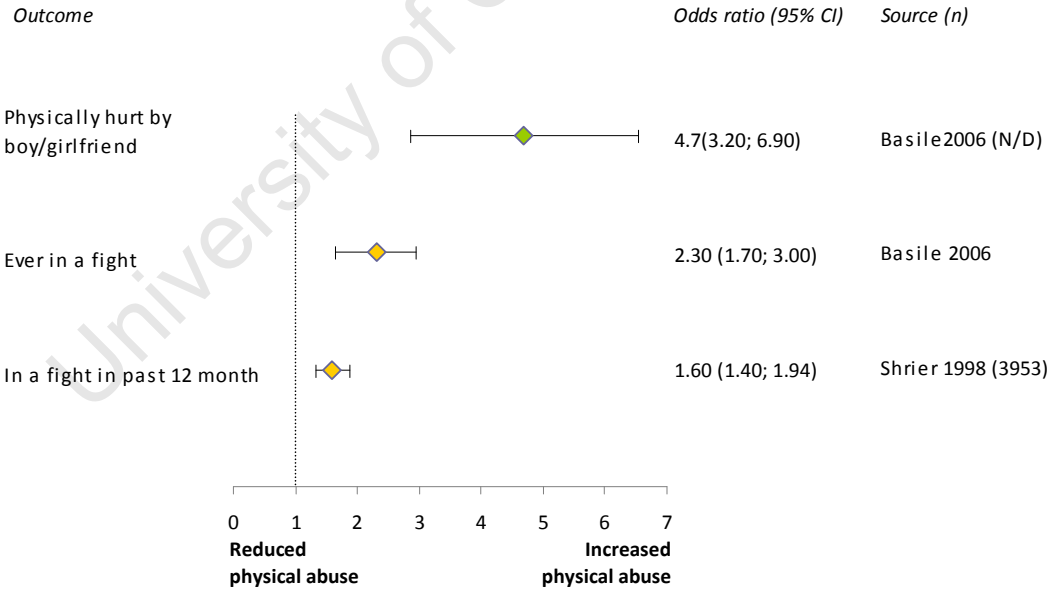
Secondly, Erulkar (2004) and Maharaj *et al* (2007) included individuals up to the age of 24 years, whereas Shrier *et al* (1998) restricted the selection of participants to students between grade 8 and 12. The settings of these 2 studies were different. The study conducted by Shrier *et al* (1998) was set in the USA where as the studies conducted by Erulkar (2004) and Maharaj *et al* (2007) were conducted in developing countries (Kenya and South Africa respectively). These demographic and social factors reduce generalisablity of the results. Additionally, in the study conducted by Shrier *et al* (1998) the larger sample size increases reliability of the odds ratio calculated and its statistical significance.

SUMMARY

Looking at all variables and confidence intervals (where available) there is little difference between males and females in the association of coercion (ever experienced in subject's lifetime) and sexual risk behaviour. Only a single result shows a contradictory relationship, but in summary the plot suggests that sexual coercion (ever experienced in subject's lifetime) does have some influence on increased sexual risk behaviour.



(a)



(b)

Figure 2.4 Forest plot reporting associations between ever experiencing sexual coercion and physical abuse perpetration or victimisation among (a) males, and (b) females

2.3.4.2 Physical abuse outcomes associated with sexual coercion

The studies depicted in Figure 2.4 presents results for males and females who were ever coerced into sex. The variables presented include *physically hurt by a boy/girlfriend* and *ever in a fight* (Basile *et al,* 2006; Shrier *et al,* 1998).

ASSOCIATION MEASURES

Forced sex

A single study (Njue *et al*, 2005) - which is not presented in Figure 2.4 - was found to measure the relationship between physical abuse perpetration and sexual coercion at first sex. Njue *et al* (2005) found that males who were coerced at first sex have 3.8 ($p<0.05$) times the odds of having physically forced a girl to have sex compared to those who were not coerced at first sex. Njue *et al* (2005) had minimal study quality limitations (Table 2.4) but the small sample size makes the generalisability of this result weak. Additional studies are required to support this relationship.

Physically hurt by a boy/girlfriend and *ever in a fight*

Two studies assessed physical abuse. Among both genders there were increased odds of experiencing physical abuse. The odds ratio for males and females physically hurt were large positive values and statistically significant. This value is about twice as large for males (OR: 8.90, $p<0.05$) as for females (OR: 4.70, $p<0.05$). Since there were no other studies with which to compare these results it cannot be validated. Males and females who were ever hurt by a

partner in addition to the results for males and females *ever in a fight* present a possible relationship between physical abuse victimisation and sexual coercion (Basile *et al,* 2006).

INFLUENCE OF BIAS

The main bias in using these results to interpret a relationship between physical abuse and sexual coercion is the detection bias. The terms 'physically hurt' and 'ever in a fight' are broad and may be interpreted very differently between participants. In particular *ever in a fight* does not specify that physical harm was inflicted. This may cause an over estimation of the odds ratio.

The difference in definition of coercion between the two studies also has an influence on the odds ratios determined. The Shrier *et al* (1998) definition of coercion differs from that of Basile *et al* (2006) as it is broader (*pressured* is used in the former and *forced* in the latter). The prevalence values support the influence on definition on exposure measure with values of 17% and 40 % for males and females in the Shrier *et al* (1998) study compared to 6.1% and 11.9% in the Basile *et al* (2006) study. The studies are comparable to that conducted in the USA, where large sample size and similar participant types were used.

SUMMARY

These results introduce sexual coercion (ever experienced in subject's lifetime) as a possible risk factor for physical abuse, but further studies are necessary.

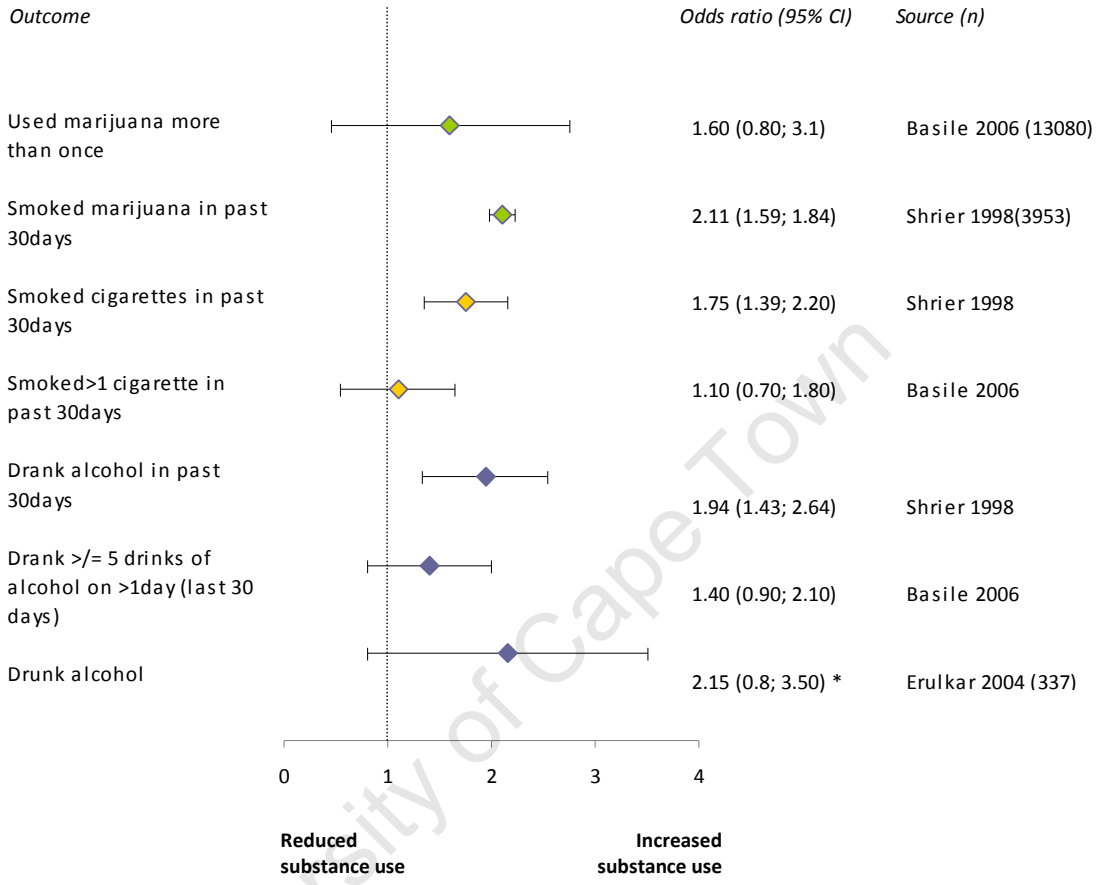


Figure 2.5 Forest plot depicting association between ever experiencing sexual coercion and substance use among males. (* dummy confidence interval)

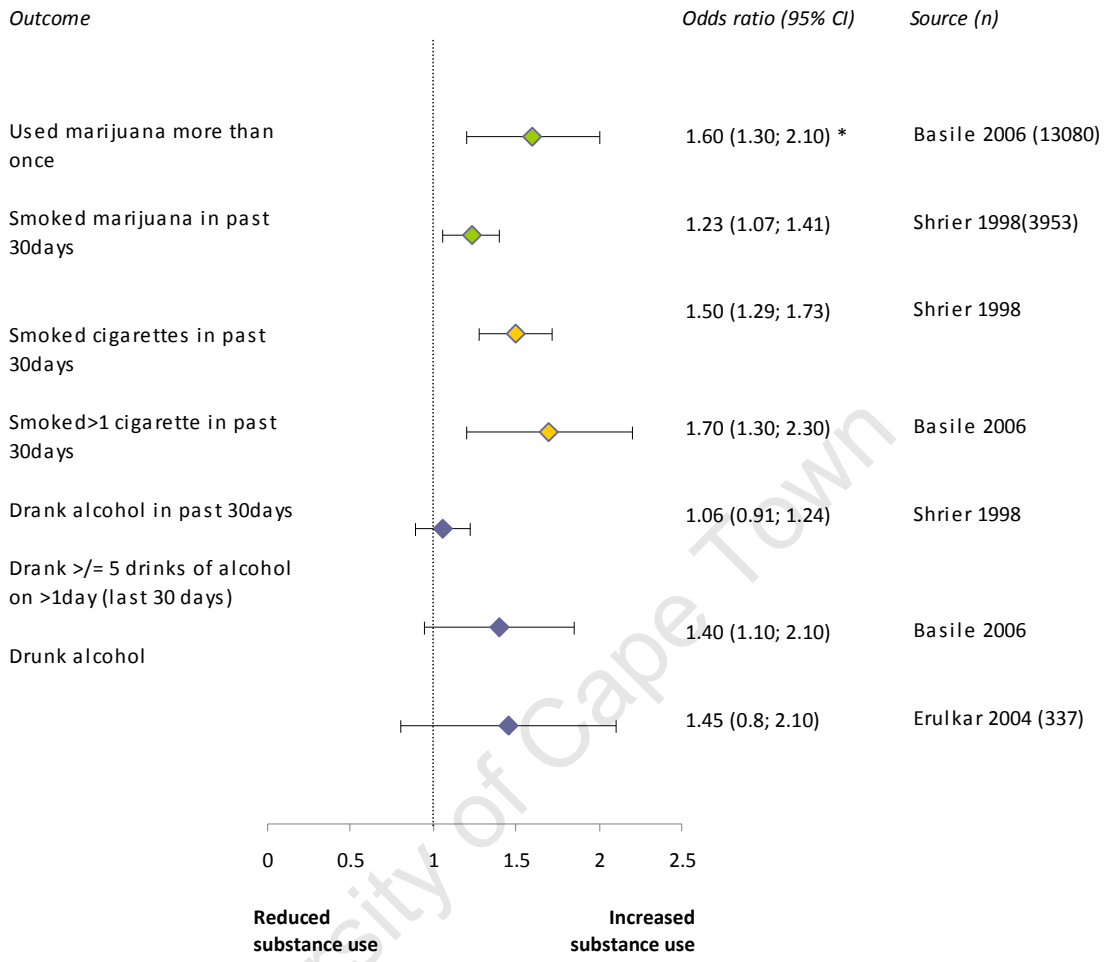


Figure 2.6 Forest plot depicting association between ever experiencing sexual coercion and substance use among females. (* dummy confidence interval)

2.3.4.3 Substance use outcomes associated with sexual coercion

Among studies addressing substance use as an outcome the indicators; *smoking marijuana, smoking cigarettes* and *drinking alcohol* were used. These outcomes measures are presented respectively in Figure 2.5 and 2.6 for males and females who have ever been coerced into having sex.

ASSOCIATION MEASURES

A single study examined the relationship between sexual coercion at first sex and substance use. Dunkle *et al* (2004) found females to have 0.33 ($p>0.05$) the odds of having a drug or alcohol problem if coerced at first sex.

Basile *et al* (1998) and Shrier *et al* (2006) addressed the relationship between ever experiencing sexual coercion and marijuana, cigarette or alcohol use. An additional study, Erulkar (2004), addressed the relationship with alcohol use. The results show increased odds of marijuana, cigarette and alcohol use for males and females alike, who have ever been coerced into sex. Not all results are significant but all confidence intervals and odds ratio values overlap. The values show strong positive relationships and the values for alcohol use appear higher among males.

INFLUENCE OF BIAS

There are limitations with interpreting the results from Dunkle *et* al (2004). Firstly, the result is statistically not significant, and secondly the sample is not representative of the general population. As discussed in section 2.3.4.1 Dunkle *et al* (2004) include only female participants seeking antenatal care. These participants may be more exposed to health promotion related to the risks of alcohol and drug use. This is too specific a sample to assume that the result applies to other populations. Also the definition of the outcome excludes non-abusive consumption of alcohol.

It is also noted that the slight difference in definition of the outcome variables between all studies would influence the association measure. For example, some studies specifically asked if the outcome occurred within a time period (drank alcohol in past 30 days) compared to others that did not narrow the time of the outcome (drank alcohol). Narrowing the time period could underestimate the prevalence of the outcome, but in turn a broad time period could increase recall bias. Given such limitations the measures of these behaviours may not be very precise but will give an estimate of the association.

The definition of coercion in Shrier *et al* (1998), as well as the absence of accounting for confounders in Basile *et al* (2006) would influence the validity of the results. Also the two studies mentioned are set in the USA where as the Erulkar (2004) study is set in Kenya, thus making it less comparable to them.

SUMMARY

Considering the bias stated these results still portray a positive relationship between sexual coercion and substance use.

2.4 Conclusion

Systematic reviews commonly summarise randomised control studies. Fewer systematic reviews include observational studies and those that do would have greater sources of bias than systematic reviews of randomised-control trial studies. Observational studies do however have particular importance in research areas where randomised studies cannot be used to answer the

research question. This could include behavioural studies where often the exposure measure cannot be imposed on the study participants as would be done in an experimental study. For instance, relating to this review, it would not be ethical to impose sexual coercion on randomly selected participants to determine the outcomes of this exposure. If a quality assessment tool is adapted and used to extensively critique the bias of observational studies, as was done in this review, such a systematic review would provide improved research value.

While carrying out the literature search for the articles in this review it was evident that most studies addressed the issue of sexual coercion from the perspective of coercion as the outcome and not the exposure. These studies assessed the predictors of sexual coercion and the influence of risk behaviour at the time of coerced sex. Since the inclusion criteria specify that sexual coercion should be presented as an outcome measure, all articles where it is defined as an exposure were excluded. This is however a limitation of the review. In instances where the excluded studies are cross-sectional with sexual coercion defined as an outcome, sexual coercion could also be considered a possible exposure. Nonetheless, the modest number of studies presented indicates the clear gap in research on the relationship between sexual coercion and risk behaviours, particularly physical abuse and substance use.

From the articles reviewed it can be summarised that the studies included in this review focus mainly on the outcomes of sexual risk behaviour among females, and they indicate a positive association with the exposure (sexual coercion) and

the outcomes (sexual risk, physical abuse, and substance use). There is a lack of sufficient studies including males, and addressing physical abuse and substance use as outcomes. However, the results depicted a possible trend towards positive associations for both genders for these outcomes of physical abuse and substance use. Moreover, the cross-sectional design of the studies potentially introduces strong bias due to temporality, thus reducing the validity of these results.

Sexual coercion may influence the risk behaviour outcomes at a personal level, however there are multiple social or environmental aspects that were not considered in this review. This puts suggests the need for future studies to utilise more detailed models of behaviour in the research area of sexual coercion and risk behaviour.

This review also presents the need for improved quality of studies, and more longitudinal design studies on the topic. Such research findings are important for the understanding of areas of prevention of these risk behaviours and support the added benefit of interventions in sexual violence.

The first part of this dissertation has uniquely presented a systematic review of research that assesses the relationship between sexual coercion and risk behaviours where sexual coercion is the risk factor. Chapter 3 provides a novel longitudinal assessment of the association to further validate and compare the findings from the review articles.

CHAPTER 3

Sexual coercion & risk behaviour associations

3.1 Introduction

As presented in the introduction and systematic review (Chapter 1 and 2) most studies around the topic of sexual coercion place focus on 'ever' being coerced and not coercion at 'first sex'. A statistical analysis of a longitudinal study was carried out to further assess the influence of coercion at 'first sex' on outcomes of sexual risk behaviour, physical abuse, and substance use, particularly in a South African setting.

Between 1997 and 2004 a program was launched to promote sexual and reproductive health using school-based HIV/AIDS prevention in sub-Saharan Africa. The main objectives were to develop, implement, and evaluate interventions effective in promoting sexual and reproductive health, and to reduce the spread of sexually transmitted infections including HIV among adolescents between the ages of 12 and 14 years in Sub-Saharan Africa. The program was carried out at two sites in South Africa (Cape Town and Polokwane) and one site in Tanzania (Dar es Salaam), hence it was named the SATZ project. The interventions aimed to postpone the onset of sexual activity in those who were not yet sexually active, and to increase safe sex practices in those that were sexually active. Quantitative assessment of the project was used to evaluate the outcomes.

The results and data from this project presented an opportunity to assess the influence of coercion at first sex on later risk behaviour as introduced in the systematic review (Chapter 2). This chapter, using the SATZ data from the Cape Town sites, aims to assess the extent to which coercion at first sex predicts sexual risk behaviour, experience of physical abuse, perpetration of physical abuse, and substance abuse among grade 8 adolescents.

3.2 Methods

3.2.1 SATZ project methodology

The SATZ study used a large multi-site prospective panel study design. In each of the three sites a cluster-randomised control study was carried out, with a school represented a single cluster. All students in grade 8 at baseline were invited to participate in the study. Data was collected using a questionnaire at 3 time points: baseline, immediately after the intervention, and approximately 6 months later, between 2004 and 2005. A more detailed description of the SATZ study design can be found in Aarø *et al* (2006).

For the purpose of this dissertation, only data from sexually active participants in the Cape Town panel control group, at baseline and first follow-up was used. Only sexually active participants were included since the exposure addressed is sexual coercion at first *sex.* The final sample consisted of 1136 grade 8 learners.

3.2.2 Hypotheses

The analysis tested three hypotheses. These hypotheses are depicted in the models in Figure 3.1.

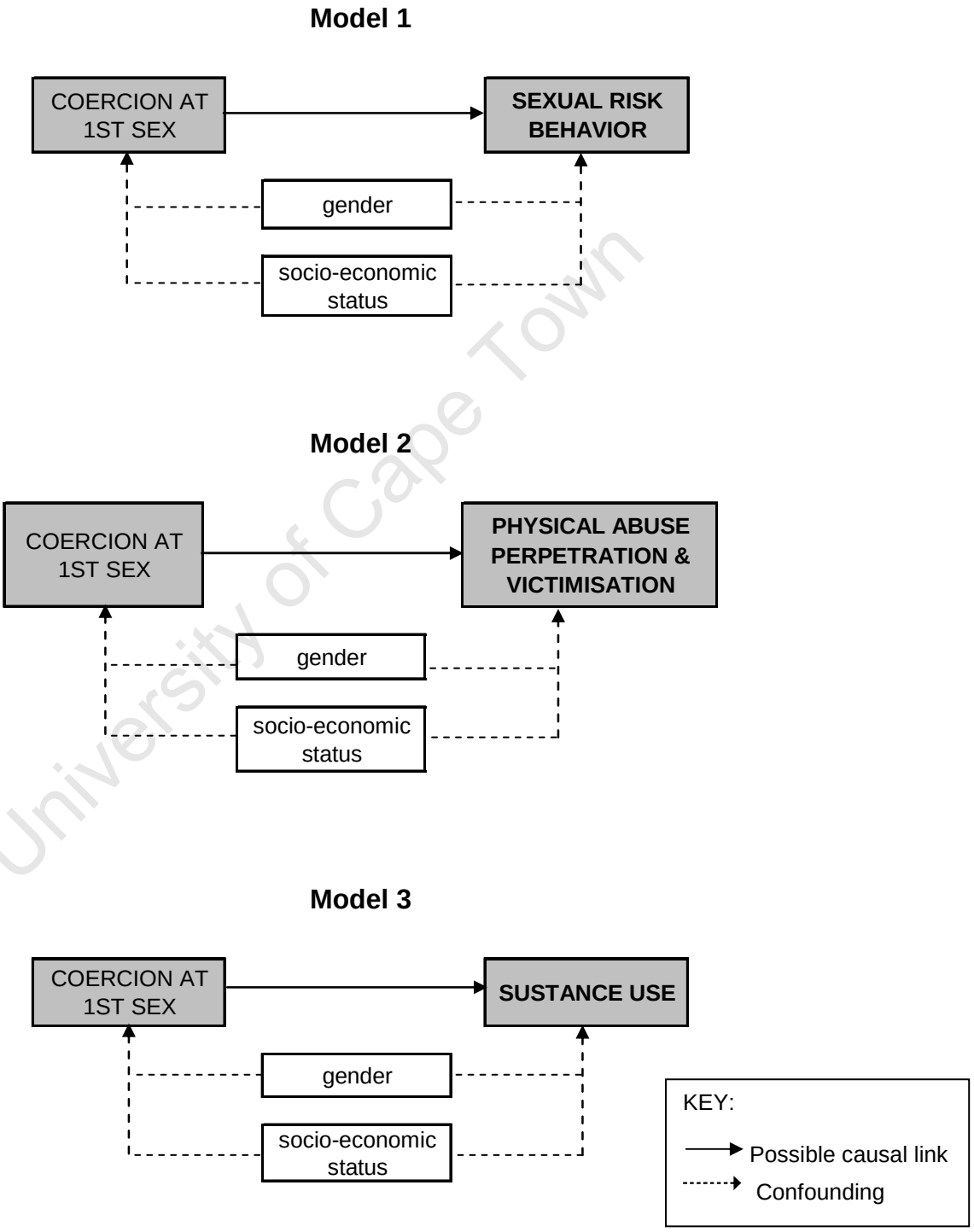


Figure 3.1 Diagrammatic models depicting hypotheses to be statistically tested

Model 1 represents a relationship between being coerced at first sex and the outcome of subsequent sexual risk behaviour, where gender and socio-economic status (SES) are confounders. Model 2 represents a relationship between being coerced at first sex and the outcome of subsequent physical abuse victimisation or perpetration, where gender and SES are confounders. Model 3 represents a relationship between being coerced at first sex and the outcome of subsequent substance use, where gender and SES are confounders.

The hypotheses tested whether that the relationships proposed in the three models are true, statistically significant relationships among sexually active adolescents.

3.2.3 Variables

In order to test the hypotheses the variables in the hypothesised model should be defined. These variables include the explanatory, the outcome, and confounding variables. The outcome variables are those that measure the occurrence of the event of interest amongst the participants in the study, reported at the first follow-up visit. The explanatory variable is hypothesised to have a relationship with the occurrence of the outcome reported at baseline or first follow-up. The confounding variables are the factors that may distort the true effect of the explanatory variable on the outcome variable. Gender and socio-economic status are included as confounders in assessing the hypotheses. As discussed in the previous chapter females appear to have a higher risk of being

sexually coerced. Additionally few studies include both male and female participants. The systematic review also presented potential differences in coercion prevalence between developing and developed countries; hence socio-economic status is included as a confounder. These factors are predicted to have an influence on both the exposure and outcomes. Age was excluded because of the compressed age range. For each hypothesised model there are multiple specific indicators that represent each outcome. For example 3 indicators, *age at first sex*, *number of sex partners* and *condom use,* can be measured to represent sexual risk behaviour. The same can be said for the measures of socio-economic status, physical abuse and substance use. Each measure used to test the hypotheses is listed as variables and indicators in Table 3.1. The table further specifies at what point in the study the variable was measured. The specific questions posed and response options used in the study questionnaire to reach these variables can be found in Appendix 1.

3.2.4 Data management

3.2.4.1 Dataset

All data collected in the SATZ study were captured on SPSS 16.0 (2007). The data was then exported to Stata 10.0 (2007) for statistical analysis.

3.2.4.2 Exclusion

Participants with inconsistent responses are excluded from the analyses. For example, participants who responded “no” to the question “Have you ever been

forced to have sex?", but answered "I was forced" to the question "Which of the following best describes your first sex?" were excluded.

3.2.4.3 Variable adjustment

For the purpose of this analysis binary variables were generated for all variables. These adjustments are described in Appendix 1.

Table 3.1 List of types of variables, the indicator and time period specifications, and measurement time point used to assess the hypotheses

Variable	Indicator	Time of measure
Explanatory		Baseline and follow-up
Coercion at first sex	Being forced or threatened into having sex, or raped	
Outcome		Follow-up
Sexual abuse	Age at first sex younger than 13 years	
	More than 2 sex partners (in the participants' lifetime)	
	Sex without a condom (in the participants' lifetime)	
	Unwanted pregnancy (in the participants' lifetime)	
	Transactional sex (in the participants' lifetime)	
Physical abuse (perpetration and/or victimisation)	Being beaten up/beating someone up (in the participants' lifetime)	
	Being punched/ever punching someone (in the participants' lifetime)	
	Being forced to have sex/forcing someone to have sex (in the participants' lifetime)	
Substance use	Smoking cigarettes (in the past 4 weeks)	
	Consuming alcohol (in the past 4 weeks)	
	Smoking marijuana (in the past 4 weeks)	
Confounding factors		Follow-up
Gender	Males and females	
Socio-economic status	Material possessions (currently)	
	Disposable income (currently)	
	Number of people living in one home (currently)	

3.2.5 Statistical methods

The Stata 10.0 (2007) statistical analysis program was used to analyse the data and test the hypotheses stated. The analysis aims to identify the relationship between the outcomes and sexual coercion, taking into account the influence of confounding factors.

3.2.5.1 Exploratory analysis

The outcomes indicators were pooled for exploratory analysis. The outcomes *any sexual risk*, *any physical abuse victimisation*, *any physical abuse perpetration*, and *any substance use* were generated measuring which participants provided a positive response to one or more indicators. The proportion of each pooled outcome was calculated and compared between genders. The chi-squared (χ^2) test for association was used to assess if any of the proportions of outcomes were significantly different if coerced at first sex. This too was stratified by gender. The general characteristics of the data were presented and interpreted.

3.2.5.2 Multilevel mixed-effects logistic modelling

The multilevel mixed-effects logistic modelling technique was selected to assess the statistical relationship between outcomes and the explanatory variable, adjusting for confounders. Odds ratios were generated which measure the odds of the outcome given that the participant is coerced at first sex. Only participants who had ever had sexual intercourse were included in the model. The comparison groups were those that were coerced at first sex and those that

were not coerced at first sex. A regression model was estimated for each question in each outcome category. For example, “Ever had sex without a condom?” would be one model for sexual risk behaviour. The odds ratios were interpreted at a level of significance of 0.05 and presented in tabular format.

This form of modelling takes into account both random and fixed effects, and additionally accounting for sampling effect and missing data. Since the participants were selected (randomly) from a group of schools the model assessed the effect of the cluster sample on the data as this accounts for the cluster as a confounder.

3.3 Results and Discussion

3.3.1 Data characteristics

3.3.1.1 Demographic characteristics

The schools selected for the study were randomly selected from secondary schools in the Cape Peninsula. The participants included individuals between the ages 13 and 15 years in grade 8. There are multiple outlier values, most of which are invalid responses where participants have reported ages as high as 91 years and as low as 1 year old. The unknown ages may have some influence on bias of the results. However the highest frequency age responses were 13 and 14 years old. The distribution of socio-demographic status of these participants follows a non-normal distribution (Shapiro Wilk test: $z=3.35$, $p\text{-value}<0.05$). Most participants tend to have some form of resources/assets and disposable income and less than 10 people living in one household. The sample

race distribution consists of 10% white, 33% black, 38% coloured, and 18% other and undefined races. Among these individuals 61% reported being Christian, 10% Muslim, and 29% other or undefined religions.

3.3.1.2 Outcome and explanatory proportions stratified by gender

Further baseline characteristics included in the analysis is summarised in Table 3.2 and 3.3. The tables present the sample characteristics, baseline proportions of explanatory and outcome measures (pooled), and the proportions of demographic/confounder measures. The proportions of participants experiencing the outcomes (pooled) were then stratified by experience of sexual coercion and gender. The reason for the 2 sample sizes is because some of the sexual risk behaviour indicator variables included a response 'never had sex'. The number of participants that used this response contradicted the number that responded to the question on sexual activity; hence all those with contradictory responses were excluded. However, this was not done in analysis of physical abuse or substance use as these were assessed independently.

Table 3.2 Summary statistics including percentage of responses to each sexual behaviour measurement stratified by gender

Measurement	Response*	Percentage (%)	
		Males (n=619)	Females (n=338)
No. schools	13		
Coerced at first sex	Yes	15	9
	Undefined	28	42
Any sexual risk behaviour	Yes	71	53
	Undefined	19	36
Socio-economic status	Lower	36	46
	Higher	50	47
	Undefined	14	8

* An 'undefined' response represents an absence of a negative or positive response to the measurement related question

Table 3.3 Summary statistics including percentage of responses to each physical abuse and substance use measurement stratified by gender

Measurement	Response*	Percentage (%)	
		Males (n=730)	Females (n=406)
No. schools	13		
Coerced at first sex	Yes	18	16
	Undefined	22	39
Any physical abuse victimisation	Yes	27	13
	Undefined	22	34
Any physical abuse perpetration	Yes	31	25
	Undefined	21	33
Any substance use	Yes	46	29
	Undefined	25	35
Socio-economic status	Lower	35	43
	Higher	50	48
	Undefined	15	9

* An 'undefined' response represents an absence of a negative or positive response to the measurement related question

These samples of sexually active adolescents make up 40% of the males and 38% of females in the original SATZ sample (Cape Town panel). This indicates there is little difference between sexual activity of males and females. Both datasets have a larger proportion of males than females, as depicted in Table 3.2 and 3.3 respectively. The prevalence of sexual coercion differs largely between genders in the first dataset and only slightly in the second dataset. This prevalence ranges between 15 and 18% for males, and 9 and 16% for females. However it is important to note the large percentage (42%) of undefined sexual coercion responses among females in the sexual risk behaviour dataset. This data bias could result in an under or overestimation of the coercion prevalence and associations with respective outcomes.

The tables also indicate that there are a larger percentage of males than females who have responded affirmatively to at least one form of sexual risk behaviour. A similar pattern, although much lower, is seen between genders for physical abuse and substance use responses. This indicates that sexual risk behaviour may be more common or more commonly reported than physical abuse or substance use. The percentages for SES show that more participants were from a higher level SES background and these values are almost equal between datasets. These proportions are only estimates as the undefined figures again indicate there are large amounts of missing information.

3.3.1.3 Outcomes proportions stratified by gender and exposure

Table 3.4 further assesses proportion differences of outcomes stratified by coercion and gender. The table indicates a lower proportion of both male and female participants have experienced any sexual risk behaviour than compared to those who had not experienced any sexual risk behaviour. These proportions are similar whether coerced at first sex or not. The *p*-value indicates that there is no significant difference between these proportions. There is a significant difference between proportions of physical abuse perpetration among males. There is a 9% higher proportion of males who experienced any form of physical abuse perpetration who were coerced relative to those who were not coerced at first sex. This is not true among females. There is a larger proportion of females who have not been coerced, but have perpetrated any physical violence. This is however not a statistically significant difference. Interestingly among both males and females more than 50% of participants had reported at least one form of physical violence victimisation. These proportions are higher among those that are not coerced at first sex. There is a similar distribution for substance use, though the proportion of those using at least one substance is not largely different. The proportions for physical abuse victimisation and substance use are not significantly different. It is important to take into account the differences in sample sizes and missing data of the groups compared. These results present the distribution of outcomes stratified by coercion and gender. Although the information does not prove any associations, egression analysis will further addresses this in the next chapter.

Table 3.4 Distribution and difference in proportions of sexual risk, physical abuse and substance abuse outcome responses stratified by gender and experience of coercion at 1st sex, [a] n = 957, [b] n = 1136

Outcome	Response	Percentage (%)					
		Males			Females		
		Coercion at first sex			Coercion at first sex		
		Yes	No	p-value	Yes	No	p-value
Any sex risk behaviour[a]	Yes	37	35	0.3	17	20	0.85
	No	55	65		70	80	
Any physical abuse perpetration[b]	Yes	47	38	0.01	31	42	0.31
	No	45	62		59	58	
Any physical abuse victimisation[b]	Yes	82	95	0.19	69	90	0.66
	No	8	5		10	10	
Any substance use[b]	Yes	51	60	0.17	39	45	0.89
	No	41	37		50	55	

3.3.2 Regression analysis

The measure of association, odds ratios, calculated from the multilevel mixed-effects models are presented for each set of outcome indicators in Tables 3.5 to 3.7. These results are odds ratios for the associations between coercion at first sex and each risk behaviour. Socio-economic status was included in the models and was not found statistically significant in any model. All models were stratified by gender as a possible confounding factor. Conclusions could be drawn for all statistically significant results, but where this was not possible, only trends were compared between the presented results and previous reports.

Table 3.5 Association between coercion at first sex and sexual risk behaviour (n =957)

Outcomes	**Males**				**Females**			
	Coercion at first sex				Coercion at first sex			
	n	OR	p-value	95% CI	n	OR	p-value	95% CI
Age at first sex <13 years	321	0.9	0.74	0.48; 1.69	160	0.85	0.76	0.29; 2.44
Sex without a condom	375	0.71	0.22	0.42; 1.22	182	0.55	0.24	0.21; 1.48
> 2 Sex partners	383	1.21	0.48	0.71; 2.08	182	1.52	0.41	0.56; 4.09
Ever pregnant/made someone pregnant	354	0.95	0.89	0.41; 2.17	173	1.39	0.63	0.36; 5.30
Transactional sex	377	1.16	0.62	0.65; 2.08	182	0.19	0.12	0.03; 1.55

Table 3.6 Association between coercion at first sex and physical abuse (n = 1136)

Outcomes		**Males**				**Females**			
		Coercion at first sex				Coercion at first sex			
		n	OR	P-value	95% CI	n	OR	P-value	95% CI
Victimisation	Beat	454	1.51	0.11	0.91; 2.51	229	0.58	0.16	0.27; 1.23
	Punched	453	1.56	0.09	0.94; 2.59	228	1.64	0.22	0.74; 3.63
	Forced sex	452	1.20	0.5	0.71; 2.00	228	1.33	0.55	0.52; 3.39
Perpetration	Punched	454	0.95	0.84	0.59; 1.55	227	1.06	0.89	0.43; 2.61
	Forced sex	453	1.21	0.52	0.69; 2.12	228	1.31	0.6	0.48; 3.55

Table 3.7 Association between coercion at first sex and substance use (n = 1136)

Outcomes*	**Males**				**Females**			
	Coercion at first sex				Coercion at first sex			
	n	OR	P-value	95% CI	n	OR	P-value	95% CI
Cigarette smoking	447	0.72	0.16	0.46; 1.13	226	1.12	0.76	0.54; 2.35
Alcohol use	448	0.81	0.38	0.51; 1.29	227	0.55	0.13	0.26; 1.20
Marijuana use	449	0.95	0.83	0.58; 1.56	227	1.28	0.56	0.56; 2.95

* in past 4 weeks

Sexual risk behaviour

An increased sexual risk behaviour would be represented in this report by the indicators; *age at 1st sex being less than 13 years*, *ever not using a condom*, *having more than 2 sexual partners*, *ever being/making someone pregnant*, *ever having transactional s*ex.

In Table 3.5 it was presented that no association was found statistically significant (p>0.05). However, there are trends apparent among the odds ratios. Among males the association measure tended close to a value of 1, which indicates possibly no effect of sexual coercion on sexual risk behaviour among males. Among females the odds ratio trend is similar to males for age at first sex, condom use and number of sex partners. However, trends in association of pregnancy and transactional sex are opposing between genders.

A reliable conclusion cannot be made using a description of trends. One can only state that the results from the study sample indicate that there is no

association between sexual coercion at first sex and sexual risk behaviour outcomes in this study sample.

Physical abuse

An increased physical abuse victimisation would be represented by increased odds of a *partner ever beating*, or *punching* the participant, and the participant *ever being forced to have sex*. Increased physical abuse perpetration is represented by increased odds of *punching a partner* or *forcing someone to have sex*. In analysing the data on physical abuse outcomes none of the results were found statistically significant ($p>0.05$) as indicated in Table 3.6. Nonetheless, the association measures tend towards increased odds of being beaten or punched by a partner among males, but decreased odds among females if they were coerced at first sex. Both genders show a tendency towards increased odds of being punched or forced into sex. No clear trend is apparent for punching a partner and perpetration of forced sex.

Due to the results not being statistically significant it can only be summarised that there is no significant association between sexual coercion at first sex and subsequent physical abuse outcomes in the study sample.

Substance use

The results presented in Table 3.7 for substance use as an outcome was also found not to be statistically significant and there is no clear trend. None of the

confidence intervals indicate a strong tendency to either positive or negative direction.

No sound conclusions can be made from the results presented other than there is no significant association between sexual coercion at first sex and subsequent substance use.

SUMMARY

The results from this study indicate that sexual coercion has no association with the specific risk behaviour indicators measured. It may be that there is truly no relationship between sexual coercion and sexual abuse, physical abuse or substance use, or the associations are biased and truly oppose those presented.

There are multiple possible sources of bias which may have influenced these results. Hence the conclusions are not what would be expected. Even though they may follow similar trends to other reports the correlation may not be true due to there being no statistically significant results. To clarify the reasons for these conclusions the statistical limitations and sources of bias are further discussed in section 3.4.

3.4 Statistical limitations and bias

3.4.1 Sampling effect

The main sampling bias in this study would be the effect of clustering of participants in a single school may have similar behaviour outcomes due to

homogeneity within a school (e.g. specific education programs at the school, social biases within the school, etc.). This sampling effect was adjusted for in all models.

Marijuana use is a good example related to the sampling effect. It is dependent on the norms within each school and amongst pupils. One could predict that the violence differentiation in the schools due to community influence would result in the effect seen among males whereas, female sexual behaviour is strongly influenced by the school. This would be because males are most often more directly involved in physical violence than females. Once more, this would be due to the social norms found in these areas presented. The data provided does not indicate which schools and areas were included in this assessment. However, the effect of sampling method can be assessed through statistical analysis.

The effect on each model is measured by an estimate generated from the statistical assessment. These estimates are relative measures comparing variances of the sample as if each school were randomly selected, to the variances between and within each cluster. The estimate is a ratio of these variance measures. A measure of 1 indicates that there is no difference and the sampling method has little effect on the variance, and in turn on generalisability of the results. The 2 levels of sampling assessed with the regression model were the individual (participant) and cluster (school). The estimates for each model and each sampling level are presented in Appendix 2. It is common to

find a reduction in generalisability for studies due to homogeneity within clusters. As a result the sampling will influence the predictive power of the measures of association in a general population. Given that the estimate is a relative measure, an arbitrary interval of 0 to 2 was used to identify models that had weak influence by sampling method.

Most regressions show that there is little influence of sampling effect on the outcome measures. However, those that have sampling effect estimates lower than 0.09 (males - *transactional sex, being beaten, being punched, marijuana use*; and females - *transactional sex, sex without a condom, number of partners, pregnancy, and forced sex*) may have been somewhat influenced by the school from which they were selected.

In addition to this sampling effect another sampling bias is the selection of only school going adolescents, excluding older or younger adolescents and those that do not attend school. This reduces generalisability and means that the results can only be interpreted specifically for adolescents aged 13-15 years in schools in Cape Town.

3.4.2 Stratified definition of coercion

Given the broad definition and perceptions of the meaning of coercion (which included being forced to have sex, or tricked into having sex, or raped) it is possible that one specific form of coercion influences the total measure. Thus, the definition of coercion may result in measurement bias. To assess this possible effect, all outcomes were re-tested for association with the exposure in

a multilevel mixed-effect model. However, this model was repeated for the 3 specific definitions of coercion (tricked, forced and raped). Hence, 3 models were now developed for a single outcome and the associations tabulated in Appendix 3.

Between definitions of coercion there are large differences in odds ratios for both males and females. Among males more severe forms of sexual coercion (*rape* compared to *tricked*) appear to affect outcomes in increasing the odds of number of sex partners, being beaten or punched, and cigarette smoking. Among females a similar effect is seen on odds of forced sex. Large apposing association measures can also be found between the generalised definition of coercion and the more specific definitions. This was noted for females and age at first sex where generalised coercion was found to reduce the odds of early sex debut (OR: 0.85, $p>0.05$) but being forced to have first sex is associated with an increased odds of early sex (OR: 4.54, $p>0.05$). Consistencies were found between coercion definitions and outcomes of being beaten or punched for both genders, cigarette smoking in males, and marijuana smoking in females. Only 2 of the results were found statistically significant when stratified. These results were the odds of males being punched if ever raped (OR: 2.63, $p<0.05$) and the odds of females using alcohol in the last 4 weeks if ever forced to have sex (OR: 0.18, $p<0.05$).

All in all, there is clear issue of measurement bias where the difference between the generalised outcome of coercion and each specific definition of coercion

influences the outcome responses. These differences are however, subtle and non-significant in most instances.

3.4.3 Outcome measurement bias

As with the definition of the exposure (coercion at first sex) the definitions or interpretation of the outcomes indicators would be a source of measurement bias.

Firstly, for sexual behaviour indicator terms such as *age at first sex, sex without a condom, transactional sex, number of sex partners* all include the word *sex* which may be assumed to include only penetrative (anal or vaginal) sex and not necessarily oral sex or masturbatory sex. This difference in interpretation may influence the responses to the related questions. Secondly, questions for physical abuse victimisation and perpetration are influenced by interpretation due to extent or type of physical abuse. Thirdly, the substance abuse indicators are biased due to the time (4 weeks) specification. These indicators exclude any usage prior to the last 4 weeks. It also does not give any indication of abusive substance usage. Considering that the participants are aged between 13 and 15 years of age, any regular use of alcohol, narcotics and cigarettes is assumed abusive substance use. Lastly, two forms of report bias affect all indicators including the exposure indicator. It is assumed that the reported results are the truth and that the participant was able to recall all events related to the questions asked. However, there was no means of validating participant honesty or means of encouraging childhood memory.

3.4.4 Missing data

Another limitation is reporting bias as a result of missing values. The effect of this was assessed by a simple method of imputation, whereby the missing values are imputed with varying possible responses and the associations tested with each imputation. As this method is only a test on general effect of missing data the imputation was carried out with one model of weak statistical significance (ever being punched) and one highly non-significant model (pregnancy). The measures of association were then plotted as bubble plots and interpreted.

The bubble plots presented in Appendix 4 represent the change in p-value, odds ratio and standard error for two outcome measurements given the missing values are adjusted to positive or negative responses. This was tested by replacing the missing values for the outcome variables (y) and explanatory variable (x) with either positive or negative responses, then testing the influence of such change on the measure of association. Five models were compared (1) data without any change, (2) data where both outcome and explanatory responses were negative, (3) data where the outcome response was positive and explanatory response was negative, (4) data where the outcome response was negative and explanatory response was positive, (5) data where both outcome and explanatory responses were negative. Bubbles of similar size that tend to hold the same position on the graph would be an indication that the missing values have little influence on the relationship between outcomes and exposure.

The scatter of the plots and variance in standard error show that the missing values should be considered as a sample bias. These missing values represent a large portion of absent information. As a result the relationships found need to be considered conservative and may be larger, smaller, or highly significant compared to what has been presented.

3.4.5 Temporality

The study is longitudinal, where individuals that have reported coercion at baseline (and/or follow-up) were assessed for risk behaviours at follow-up. However, there are some participants that have reported coercion only at follow-up. For this group of participants it is difficult to establish the correct temporal relationship. Nonetheless, it can be assumed that this would largely include participants who chose not to report coerced first sex at baseline, even though the coercion had already occurred, but chose to only report it at follow-up. And fewer would have experienced first sex (which was coerced) during the short period between baseline and follow-up.

3.5 Conclusion

The trend in association for pregnancy and transactional sex correspond with that found in Dunkle *et al* (2004) and Koenig *et al* (2005) respectively, presented in the systematic review (Chapter 2). All other sexual behaviour results contradict those reported in Chapter 2, which indicated increased odds of sexual risk behaviour if coerced at first sex. The trend of the odds ratios for physical abuse relates to the results from Basile *et al* (2006) and Shrier *et al* (1998),

which present increased odds of physical abuse victimisation if coerced at first sex. However, the substance abuse results do not correspond to those presented by Basile *et al* (2006), Erulkar (2008) and Shrier *et al* (1998).

The analysis shows there is no statistically significant association between coercion at first sex and sexual risk behaviour, physical abuse, and substance use among the study sample of school going adolescents in Cape Town. A general trend was noted, namely, increased odds of some sexual risk behaviours and physical abuse victimisation if coerced at first sex. Even though not statistically significant, the trends correspond with the findings of previous research.

As discussed under the limitations section, this data is strongly influenced by sampling, measurement and reporting bias. Another important bias to be considered is social desirability bias and its influence on coercion responses.

The strengths of this analysis include firstly, the large sample size. Secondly, it is the first South African longitudinal study where individuals that have reported coercion at baseline were assessed for risk behaviours at follow-up. Thirdly, no other South African study has been found to assess the relationship between sexual coercion at first sex and 3 risk outcomes (sexual behaviour, physical abuse and substance use) in the same study sample.

The systematic review in Chapter 2 supports some of the results found in the statistical analysis, proposing a negative influence of sexual coercion on not only

sexual risk behaviour but also physical abuse victimisation, but no sound conclusions on physical abuse perpetration and substance use. The analysis also provides of a valuable addition of gender comparison for these outcomes.

The analysis contributes to research on this subject, as an introduction to the possible positives associations between sexual coercion and risk behaviours.

CHAPTER 4

Conclusion

The systematic review (Chapter 2) indicates the clear lack of longitudinal studies which address the relationship between sexual coercion and subsequent risk behaviour. Only 2 out of 22 studies included in the systematic review used longitudinal designs. The secondary statistical analysis (Chapter 3) contributes a third longitudinal study on the research topic. Comparing both approaches, systematic review and secondary statistical analysis of data, a more comprehensive conclusion can be made on the association between sexual coercion at first sex and sexual risk behaviour, physical abuse perpetration and victimisation, and substance use among adolescents.

The similarities found between the two approaches were participant ages and definition of exposure and outcomes measures. Both these factors would have influence on the comparability between the results from the review and statistical analysis. The age range of for the statistical analysis was narrower (13 to 15 years) but included ages found in the systematic review (10 to 25 years). The vocabulary used to measure the exposure and outcomes are found to be variable, but there is much overlap between that used in the review articles and the statistical analysis. All included 'forced' as part of the definition of the exposure, and similar indicators for each risk behaviour measure.

There are also differences between the two studies which should be accounted for in the final conclusion. These were; sampling, attrition and reporting bias. The statistical analysis included random selection, whereas only 7 of the 22 studies included randomly selected participants. Additionally the statistical analysis fares well in terms of representiveness of the sample, whereas 3 of the 22 studies included in the review presented poorly represented samples. A weakness of the statistical analysis relative to the review is the attrition rate and reporting bias which resulted in a large proportion of missing data.

The results found in the statistical analysis present a prevalence of experiencing coercion between 9% and 18% which falls in the range of 1% to 48% presented for developing countries in the systematic review. The strength of the associations found between sexual coercion and subsequent risk behaviours differ between the review and statistical analysis. The review found associations between sexual coercion and sexual risk behaviour among females, and physical abuse and substance use among both genders. The statistical analysis portrays no clear associations with any of the outcomes for either gender, however the odds ratios and confidence intervals show some trend towards positive association

The differences seen could be as a result of the bias described above. The sample representiveness in the review, and large proportion of missing data in the statistical analysis could potentially have a large influence on the findings. In addition, the results suggest that there are other possible factors which may

mediate or confound the relationships in the different settings and samples, such as family influences, social norms, and psychological factors.

In conclusion, this dissertation indicates that sexual coercion, either at first sex or ever in a life time, is a factor which predicts risk behaviour. The strength of the association varies by study. It also varies by gender, with females tending to have greater associations between sexual coercion and risk behaviours.

In this research area there is a need to identify more complex models based on evidence and theory. If all relevant social and environmental factors were taken into account it is possible that the review and statistical analysis would identify more similar associations. This presents a gap in this research area. More detailed research which includes social, environmental and personal factors, and their combined influence on sexual coercion would be valuable.

This dissertation provides a report of the study quality issues, and forms a basis and guidance for further, improved research on sexual coercion and its influence on sexual risk behaviours, and further insight intervention planning.

References

Afenyadu, D., and Goparaju, L. (2003), *Adolescent sexual and reproductive health behaviour in Dodwa, Ghana.* CEDPA, Washington

Ajuwon, A.J., Akin-Jimoh, I., Olley, B.O., and Akintola, O. (2001), *Sexual coercion: learning from the perspectives of young persons in Ibadan, Nigeria.* Reproductive Health Matters, Vol. 9 (17): 128–136

Aarø, L.E., Flisher, A.J., Kaaya, S., Onya, H., Fuglesang, M., Klepp, K., and Schaalma, H. (2006), *Promoting sexual and reproductive health in early adolescence in South Africa and Tanzania: Development of a theory- and evidence- based intervention programme.* Scandinavian Journal of Public Health, Vol. 34: 150-158

Basile K. C., Black M. C., Simon, T.R., Arias, I., Brener, N.D., and Saltzman, L.E. (2006), *The association between self-reported lifetime history of forced sexual intercourse and recent health-risk behaviours: findings from the 2003 National Youth Risk Behaviour Survey.* Journal of adolescent health, Vol 39: 752e1-752e7

Caceres, C. F. (2005), *Assessing young people's sexual experiences: lessons from Peru,* in 'Sex without consent: young people in developing countries', Jejeebhoy S. J., Shah I., *et al.* Zed books, London

Dickson, N., Paul C., Herbison, P., and Silva, P. (1998), *First sexual intercourse: age, coercion, and later regrets reported by a birth cohort.* BMJ, Vol. 316: 29-33

Drain, P., Smith, J., Hughes, J., Halperin, D., and Holmes, K. (2004), *Correlates of national HIV seroprevalence: an ecological analysis of 122 countries.* J Acquir Immune Defic Syndr, Vol. 35: 407-420

Dunkle, K. L., Jewkes R. K., Brown, H.C., Gray, G.E., McIntyre, J.A., and Harlow, S.D. (2004), *Gender-based violence, relationship power, and risk of HIV infection in women attending antenatal clinics in South Africa.* The Lancet, Vol. 363: 1415-1421

Dunkle, K., Jewkes, R., Nduna, M., Levin, J., Jama, N., Khuzwayo, N., Koss, M., and Duvvury, N. (2006) *Perpetration of partner violence in HIV risk behaviour among young men in the rural Eastern Cape, South Africa.* AIDS, Vol. 20: 1-8

Erickson, P. I., and Rapkin, A. J. (1991), *Unwanted sexual experiences among middle and high school youth.* Journal of adolescent health, Vol. 12: 319-325

Erulkar, A. S. (2004), *The experienceof sexual coercion among young people in Kenya.* International family planning perspectives, Vol. 30 (4): 182-189

Finger, W. (2004), *Non-consensual sex among youth*. Youthlens on reproductive health and HIV/AIDS, Youthnet, Arlington. No. 10 in a series

Ganju, D. (2004)b, *Sexual coercion: young men's experiences as victims and perpetrators*. Population council, New Delhi

Ganju, D. (2004)a, *The adverse health and social outcomes of sexual coercion: Experiences of young womenin developing countries*. Population council, New Delhi

Halcon, L., and Blum, R. W., (2003), *Adolescent health in the Caribbean: a regional portrait.* Adolescent health, Vol. 93: 1851-1857

Im-em, W., Kanchanachitra, S., and Archavanitkul, K. (2005), *Sexual coercion among ever-partnered women in Thailand,* in 'Sex without consent: young people in developing countries, Jejeebhoy S. J., Shah I., *et al.* Zed books, London

Jejeebhoy, S., and Bott, S. (2005), *Non-consensual sexual experiences of young people in developing countries: an overview,* in 'Sex without consent: young people in developing countries, Jejeebhoy S. J., Shah I., *et al.* Zed books, London

Jewkes R., and Abrahams N. (2002), *The epidemiology of rape and sexual coercion in South Africa: an overview.* Social science & medicine, Vol. 55: 1231-1244

Jewkes, R., Levin, J., and Pen-Kekana, L. (2002)a, *Risk factors for domestic violence: findings from a South African cross-sectional study.* Social science & medicine, Vol. 55: 1603-1617

Jewkes, R., Purna, S., and Garcia-Moreno, C. (2002)b, S*exual violence (Chapter 6), in World report on violence and health,* Krug, E.G. *et al,* World health organisation, Geneva.

Khan, S., ter Riet, G., Glanville, J., Sowden, A. J., and Kleijnen, J. (2001), *Study quality assessment, in Undertaking systematic reviews of research on effectivenes.* CDR report no. 4, 2nd edition, NHS Centre for reviews and dissemination, University of York, pp. 2-17

Koenig, M. A., Zoblotska, I., Lutalo, T., Nalugoda, F., Wagman, J., and Gray, R. (2005), *Coerced first intercourse and reproductive health among adolescent women in Rakai, Uganda,* in 'Sex without consent: young people in developing countries, Jejeebhoy S. J., Shah I., *et al.* Zed books, London

Lottes IL, Weinberg MS (1996) *Sexual Coercion among university students: a comparison of the United States and Sweden.* The Journal of sex research, Vol. 34 (1): 67-76

Maharaj ,P., and Munthree, C. (2007), *Coerced first sexual intercourse and selected reproductive health outcomes among young women in Kwazulu-Natal, South Africa.* J biosoc Sci, Vol. 39: 231-244

Mallen, C. Peat, G., and Croft, P. (2006), *Quality assessment of observational studies is not commonplace in systematic reviews.* J Clinical Epidemiology, Vol. 59: 765-769

Manzini, N. (2001), *Sexual initiation and childbearing among adolescent girls in Kwazulu Natal, South Africa.* Reproductive health matters, Vol. 9 (17), 44-52

Mathews, C., Aaro, L. E., Flisher, A. J., Mukoma, W., Wubs, A., and Shaalma, H. (2008), *Predictors of early first sexual intercourse among adolescents in Cape Town, South Africa.* Health Education Research Advance Access published January 12, 2008. doi:10.1093/her/cym079

Moore, A. M., Awusabo-Asare, K., Madise, N., John-Langba, J., and Kumi-Kyereme, A. (2007), *Coerced first sex among adolescent girls in sub-saharan Africa: prevalence and context.* Afr J Reprod Health, Vol. 11 (3): 62-82

Njue, C., Askew, I., and Chege, J.(2005), *Non-consensual sexual experiences of young people in Kenya: boys as perpetrators and victims,* in 'Sex without consent: young people in developing countries, Jejeebhoy S. J., Shah I., *et al.* Zed books, London

Pettifor, A. E., Rees, H. V., Steffenson, A., Hlongwa-Madikizela, L., MacPhail, C., Vermaak, K., and Kleinschmidt, I. (2003), *HIV and sexual behaviour among young South Africans: a national survey of 15-24 years old.* Reproductive health research unit, University of Witwatersrand, Johannesburg

Pettifor, A., Rees, H., Kleinschmidt, I., Steffenson, A., MacPhail, C., Hlongwa-Madikizela, L., Vermaak, L. and Padian, N. (2005), *Young people's sexual health in South Africa: HIV prevalence and sexual behaviours from a nationally representative household survey.* AIDS; Vol. 19: 1525-1534

Rivis, A., Sheeran, P., and Armitage, C.J. (2006) *Augmenting the theory of planned behaviour with the prototype/willingness model: Predictive validity of actor versus abstainer prototypes for adolescents' health-protective and health-risk intentions.* British Journal of Health Psychology, Vol. 11: 483-500

Senn, T. E., Carey, M. P., Vanable, P.A., Coury-Doniger, P., and Urban, M. (2007), *Characteristics of secual abuse in childhood and adolescence influence sexual risk behavior in adulthood.* Arch sex behav, Vol 36: 637-645

Shrier L. A., Pierce, J. D., Emans, J., DuRant, R.H. (1998), *Gender differences in risk behaviours associated with forced or pressured sex.* Arch pediatr adolesc med, Vol. 152: 57-63

Siegfried, N. Muller, M., Volmink, J., Deeks, J.J., Egger, M., Low, N.N., Weiss, H.H., Walker, S.A. and Williamson, P.R. (2003), *Male circumcision for prevention of heterosexual acquisition of HIV in men.* Cochrane database of systematic reviews, Issue 3

Stroup, D. F., Berlin, J. A., Morton, S. C., Olkin, I., Williamson, G. D., Rennie, D., Moher, D., Becker, B., Sipe, T. A. and Thacker, S. B. (2000), *Meta analysis of observational studies in epidemiology: A proposal for reporting.* JAMA, Vol. 283: 2008-2012

Tubman, J. G., Langer, L. M., Calderon, D.M. (2001), *Coerced sexual experiences among adolescent substance abusers: a potential pathway to increased vulnerability to HIV exposure.* Child and adolescent social work journal, Vol. 18 (4), 281-303

Upchurch D. M, and Kusunoki Y. (2004), *Associations between forced sex, sexual and protective practices, and sexually transmitted diseases among a national sample of adolescent girls.* Women's health issues, Vol. 14: 75-84

Violence against women: a priority issue. (1997), Women's health and development. World health organisation, family and reproductive health.

Wang B., Li X., Stanton, B., Fang, X., Yang, H., Zhao, R., Hong, Y. (2007), *Sexual coercion, HIV related risk, and mental health among female sex workers in China.* Health care for women international, Vol. 28: 745-762

Appendices

Appendix 1

Table A. 1 List of questions and responses used for data collection

Category	Question	Response options
Explanatory variable	Which of the following best describes the 1st time you had sex? Choose only one.*	1. I have never had sex
		2. I was willing
		3. I was persuaded
		4. I was tricked
		5. I was forced
		6. I was raped
		Binary Variable generated: 1 Coerced = tricked, and/or forced, and/or raped 0 Not coerced = willing, and/or persuaded
Outcome 1: Sexual risk behaviour	If you have had sexual intercourse, how old were you when you did so for the 1st time?	Continuous
		Binary Variable generated: 1 Age at first sex >13 years 0 Age at first sex </=13 years
	With how many different people have you had sex with in your life?	Continuous
		Binary Variable generated: 1 >/= 2 sex partners 0 < 2 sex partners
	Have you ever had sex without your partner using a condom?	1. Yes 2. No 3. Never had sex
	Have you ever been pregnant?	Yes/no
	Have you ever received money, food, drinks or other gifts in exchange for sex?	1. Yes 2. No 3. Never had sex

* Binary variable formed by grouping options 4-6 and defined as coercion, where options 1-3 was defined as not coerced

Table A.1 Continued. List of questions and responses used for data collection

Category	Question	Response options
Outcome 2: Physical abuse	Have you ever had a boyfriend who beat you up?	Yes/no
	Has a boy/girlfriend ever punch you or hit you with something that could hurt you?	Yes/no
	Have you ever punched or hit a boy/girlfriend with something that could hurt them?	Yes/no
	Have you ever had a boy/girlfriend who physically forced you to have sex when you did not want to?	Yes/no
	Have you ever forced someone to have sex with you when they did not want to?	Yes/no
Outcome 3: Substance use	During the past 4 weeks (1 month), did you smoke a whole cigarette?	Yes/no
	During the past weeks (1 month), did you use alcohol (including beer and wine), other than a few sips?	Yes/no
	During the past 4 weeks (1 month), did you smoke marijuana (dagga)?	Yes/no
Confounders	Gender	Male/female
Confounders	Socio-economic status	Sum score: (zhavesa + zv16ax + (zsleepaln x (-1))
	zhavesa: Number of things they have at baseline	television/electricity/bicycle/tap water/motor car
	zv16ax: Which of the the following things is true for your home?	1. We don't have enough money for food
		2. We have enough money for food but not other items like clothes
		3. We have money for food and clothes but not much else
		4. We have money for most important things but few luxury goods
		5. We have money for luxury goods and extra
	zsleepaln: Number of people sleeping in the same room	continuous

Appendix 2

Table A.2 Sampling effect estimates to assess influence of clustering

	Outcome measure	Males		Females	
		Estimate	95%CI	Estimate	95%CI
Sexual risk behaviour	Age at first sex <13 years	0.28	0.05; 1.58	0.83	0.37; 1.86
	Sex without a condom	0.49	0.21; 1.14	2.15E-08	0; .
	> 2 Sexual partners	0.61	0.33; 1.13	4.70E-08	0; .
	Ever pregnant/made someone pregnant	0.29	0.03; 2.91	3.31E-09	0; .
	Transactional sex	4.85E-10	0; .	1.27E-05	0; .
Physical abuse victimisation	Beat	5.64E-07	0; .	0.52	0.16; 1.63
	Punched	0.24	0.03; 1.60	0.4	0.09; 1.86
	Forced sex	0.19	0.03; 1.27	3.45E-09	0; .
Physical abuse perpetration	Punched	4.09E-06	0; .	0.42	0.12; 1.53
	Forced sex	0.4	0.15; 1.04	3.26E-12	0; .
Substance use	Cigarette smoking	0.16	0.02; 1.76	0.53	0.21; 1.33
	Alcohol use	0.21	0.05; 0.86	0.69	0.30; 1.62
	Marijuana use	1.00E-11	0; .	0.25	0.02; 2.88

Appendix 3

Table A.3 Stratification by coercion definition, males

	Outcome measure	Odds ratios			
		Coercion	**Tricked**	**Forced**	**Raped**
Sexual risk behaviour	Age at first sex <13 years	0.9	1.16	1.8	0.48
	Sex without a condom	0.71	0.95	0.41	0.99
	> 2 sexual partners	1.21	0.94	1.54	1.36
	Ever pregnant/made someone pregnant	0.95	2.22	0.34	0
	Transactional sex	1.16	1.09	0.67	2.35
Physical abuse victimisation	Beat	1.51	1.33	1.45	1.52
	Punched	1.56	1.01	1.44	2.63*
	Forced sex	1.2	1.74	0.38	1.37
Physical abuse perpetration	Punched	0.95	1.31	0.5	1.00
	Forced sex	1.21	1.78	0.33	1.32
Substance use	Cigarette smoking	0.72	0.65	0.8	0.92
	Alcohol use	0.81	1.16	0.63	0.62
	Marijuana use	0.95	1.09	0.71	1.02

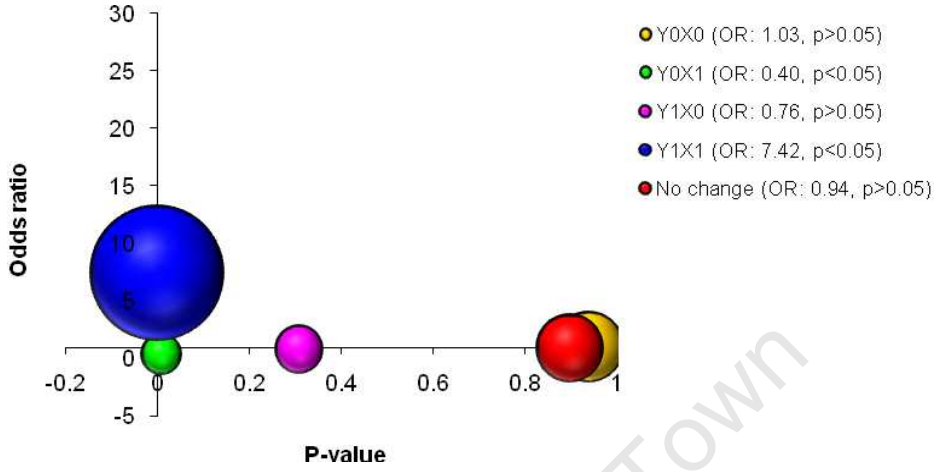
* $p<0.05$

Table A.4 Stratification by coercion definition, females

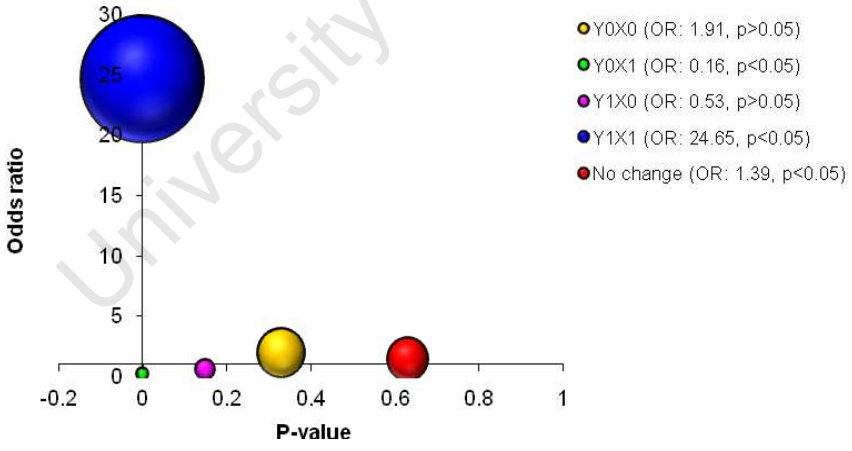
	Outcome measure	Odds ratios			
		Coercion	Tricked	Forced	Raped
Sexual risk behaviour	Age at first sex <13 years	0.85	0.67	4.54	0.14
	Sex without a condom	0.55	0.2	2.39	1.25
	> 2 sexual partners	1.52	1.84	1.31	4.7
	Ever pregnant/made someone pregnant	1.39	1.04	0	0.95
	Transactional sex	0.19	0	0	0
Physical abuse victimisation	Beat	0.58	0.57	0.99	0.47
	Punched	1.64	1.99	1.63	1.1
	Forced sex	1.33	0.61	1.17	1.85
Physical abuse perpetration	Punched	1.06	1.69	1.35	0.54
	Forced sex	1.31	1.63	1.41	0.91
Substance use	Cigarette smoking	1.12	1.42	0.63	1.32
	Alcohol use	0.55	1.4	0.18*	0.73
	Marijuana use	1.28	1.42	1.18	1.12

* $p<0.05$

Appendix 4

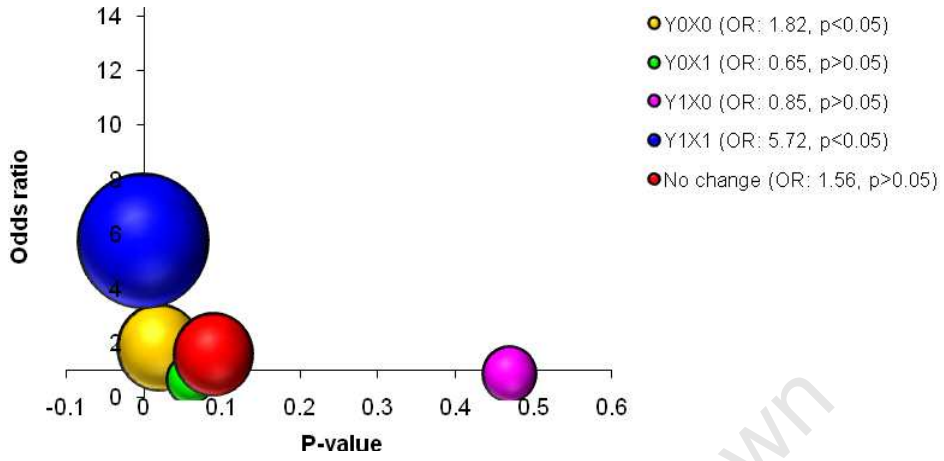


(a)

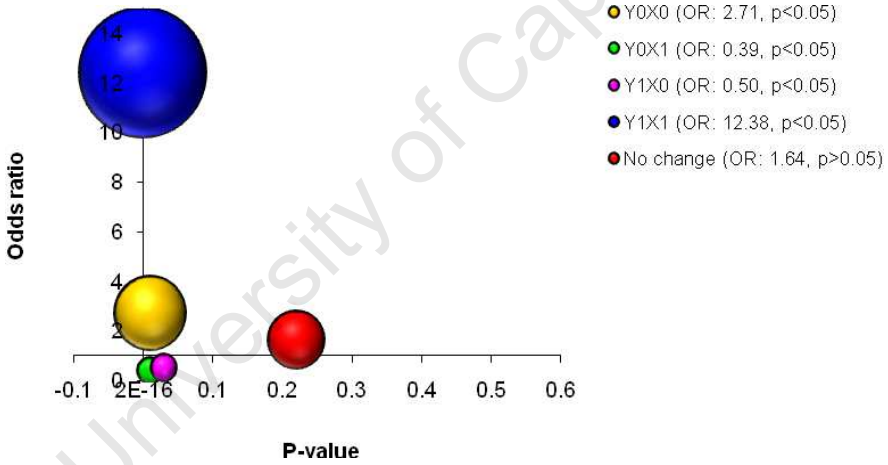


(b)

Figure A.1 Imputation presentation of (a) males and (b) females *ever pregnant or made someone pregnant*



(a)



(b)

Figure A.2 Imputation presentation of (a) males and (b) females *ever been punched*